

ACCel500
STOP TAPE APPLICATION SOFTWARE

Part Number 695117.V10

AVTRON INDUSTRIAL AUTOMATION, INC.
Cleveland, Ohio

ACCEL500
STOP TAPE APPLICATION SOFTWARE
Part Number 695117.V10

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
DIFFERENCE DATA	v
I INTRODUCTION AND GENERAL INFORMATION	1-1
II SELECTING THE CONTROL MODE	2-1
2-1 Remote Operation	2-1
2-2 Local Drive Keypad.....	2-1
2-3 PC Control (Computer Diagnostic Software ADDaptACC)	2-2
III KEYPAD AND PARAMETER DESCRIPTIONS	3-1
3-1 ACCel500 Keypad Operation	3-1
3-2 Menu Navigation	3-3
3-2.1 Navigation Tips.....	3-3
3-2.2 Main Menu.....	3-4
3-2.3 Monitor Menu (M1).....	3-6
3-2.4 Parameter Menu (M2).....	3-7
3-2.5 Keypad Control Menu (M3)	3-8
3-2.6 Active Faults Menu (M4).....	3-9
3-2.7 Fault History Menu (M5).....	3-11
3-2.8 System Menu (M6)	3-12
3-2.9 Expander Board Menu (M7).....	3-18
3-2.10 Editing a Numeric Value	3-19
3-2.11 Editing a Configuration Value	3-19
3-2.12 Editing a Selection Value.....	3-20
3-2.13 Keypad Removal While Drive is Running	3-20
3-2.14 Stop Fault.....	3-20
3-2.15 Remote Keypad.....	3-20
IV I/O PARAMETER DESCRIPTIONS.....	4-1
4-1 Analog Inputs.....	4-1
4-2 Analog Outputs	4-2
4-3 Digital Inputs	4-3
4-4 Digital Outputs.....	4-3

TABLE OF CONTENTS (continued)

<u>SECTION</u>		<u>PAGE</u>
4-5	Encoder Counter Inputs	4-4
4-6	Driver Hardware Inputs	4-5
V	LOGIC SEQUENCE	5-1
5-1	Miscellaneous Logic	5-1
5-2	Remote Operation	5-1
5-2.1	Run OK	5-1
5-2.2	Jog FR Input.....	5-2
5-2.3	Start Input.....	5-2
5-2.4	Run Enable.....	5-2
5-2.5	Thread Enable	5-3
5-2.6	Jog Enable	5-3
5-2.7	RJT Enable.....	5-3
5-2.8	Run Request.....	5-4
5-2.9	MC Run.....	5-4
5-2.10	Cntrl Inhib.....	5-4
5-2.11	Fast Stop.....	5-4
5-2.12	Coast Stop	5-4
5-2.13	Cntrl Mode	5-5
5-2.14	Ramp Delays.....	5-5
5-2.15	Motor Control Mode	5-5
5-3	Local Drive Keypad.....	5-6
5-3.1	Local Run Mode	5-6
5-3.2	Button Stop Fault	5-6
5-4	ADDaptACC Software Control	5-6
VI	REFERENCING AND OUTER CONTROL BLOCK.....	6-1
6-1	Speed Ramp Reference	6-1
6-1.1	Run References	6-1
6-1.2	Increase/Decrease Commands	6-2
6-1.3	Ratio/Difference Draw.....	6-2
6-1.4	Speed Reference Selection.....	6-3
6-1.5	Reverse.....	6-3
6-1.6	Reference Selection and Ramp Hold	6-4
6-1.7	Skip Frequency and Reference Polarity.....	6-5
6-1.8	Low Pass and Delay.....	6-6
6-1.9	Ramping.....	6-7
6-1.10	Ramp Options	6-8
6-1.11	Ramp Outputs	6-9
6-2	PI Limiters	6-9
6-2.1	Open Loop Overvoltage Limiter.....	6-10
6-2.2	Open Loop Undervoltage Limiter.....	6-11
6-2.3	Open Loop Current Limiter	6-12

TABLE OF CONTENTS (continued)

<u>SECTION</u>	<u>PAGE</u>
6-2.4	Open Loop Torque Limiter 6-13
6-2.5	Closed Loop Over Voltage Limiter 6-14
6-3	Speed Step Reference 6-15
6-3.1	Speed Step References 6-15
6-3.2	Speed Step Scaling, Reverse and Limits 6-16
6-3.3	Open Loop Step Reference 6-16
6-3.4	Closed Loop Step Reference 6-17
6-4	Tension Loop 6-18
6-4.1	Tension Reference – Setpoints 6-19
6-4.2	Tension Reference – Ramp and Transfer 6-20
6-4.3	Tension Loop 6-21
6-4.4	Tension Loop – Output 6-22
6-4.5	Tension Loop – Feedback Comparitor 6-22
6-5	Spare Blocks 6-23
6-5.1	Spare Reference Blocks 6-23
6-5.2	Spare Logic Blocks 6-25
VII	MOTOR CONTROL MODE 7-1
7-1	Torque Reference 7-1
7-1.1	Torque Reference Blocks 7-1
7-1.2	Torque Reference Enable, Ramp and Limits 7-2
7-1.3	Torque Reference Firmware, Part I 7-2
7-1.4	Torque Reference Firmware, Part II 7-3
7-2	Open Loop Control 7-4
7-2.1	Torque Stabilizer 7-4
7-2.2	DC-Link Stabilizer 7-4
7-2.3	Flux Stabilizer 7-5
7-2.4	Open Loop Frequency Reference (MotorControlMode = 0) 7-6
7-2.5	Open Loop Speed Control (MotorControlMode = 1) 7-8
7-2.6	Open Loop Torque Control (MotorControlMode = 2) 7-9
7-3	Closed Loop Control 7-10
7-3.1	Closed Loop Speed Control (MotorControlMode = 3) 7-10
7-3.2	Closed Loop Torque Control (MotorControlMode = 4) 7-15
7-3.3	Flux Reference 7-17
7-3.4	Flux Modeling 7-18
7-3.5	Current Control Loop 7-19
VIII	MISCELLANEOUS CONTROL BLOCKS 8-1
8-1	Overspeed and At Zero Speed 8-1
8-2	Motor Braking 8-1
8-2.1	DC Braking 8-1
8-2.2	Flux Braking 8-2

TABLE OF CONTENTS (continued)

<u>SECTION</u>	<u>PAGE</u>
8-3 Switching Frequency	8-2
8-4 Parameter Sets.....	8-2
IX COMMUNICATIONS	9-1
9-1 Read and Write Standard ID Numbers	9-1
9-2 Special Field Bus Variables.....	9-3
9-3 Faults.....	9-3
9-4 System Bus.....	9-4
X FAULT CODES.....	10-1
10-1 Fault Actions	10-1
10-2 Stop Action	10-1
10-3 Fault Reset	10-1
10-4 Recording.....	10-2
10-5 Drive Faults.....	10-3
10-6 Drive Fault Options.....	10-6
10-7 Specific Fault Setup	10-7
10-7.1 User Faults	10-7
10-7.2 Motor Over Temp	10-7
10-7.3 Motor Stall	10-8
10-7.4 Thermistor.....	10-8
10-7.5 Under Load	10-8
XI QUICK STARTUP	11-1
11-1 Startup Wizard	11-1
11-2 Identification	11-1
APPENDIX A Software Block Diagrams	
APPENDIX B Parameter List	
APPENDIX C Alphabetical Cross-Reference	
APPENDIX D Parameter ID Number Cross-Reference	

DIFFERENCE DATA

7-4 STOP TAPE LOGIC (See Appendix A-11)

The stop tape logic is a state machine that temporarily slows down the tapes and supplies an output to fire the fingers.

7-4.1 TORQUE REFERENCE BLOCKS

Parameters	Type	Default
<i>ST Edge In IP</i>	BCFG	Zero Bit
<i>ST Arm Inp ID</i>	BCFG	Zero Bit
<i>ST Cnts Spt</i>	ACFG	<i>ST Delay Count</i> = 1024 counts
<i>ST Counter ID</i>	ACFG	<i>Counter1</i>
<i>ST DecelTim ID</i>	ACFG	<i>ST DecelTim</i> = 50 Tics
<i>ST Accel Tim ID</i>	ACFG	<i>ST Accel Tim</i> = 50 Tics
<i>ST Slow Dec ID</i>	ACFG	<i>ST Decel Slow</i> = 5.0 seconds
<i>ST Fast Dec ID</i>	ACFG	<i>ST Decel Fast</i> = 2.0 seconds
<i>ST Slow Acc ID</i>	ACFG	<i>ST Accel Slow</i> = 5.0 seconds
<i>ST Fast Acc ID</i>	ACFG	<i>ST Accel Fast</i> = 2.0 seconds
<i>ST Fire OUT</i>	DPB	
<i>ST Cntr Hold</i>	DPB	
<i>ST Cntr Res</i>	DPB	
<i>Ramt to 0</i>	DPB	

Stop tape state machine:

Low to high transition of *ST Arm Inp ID* starts the state machine in state 0. If the run is removed at any point, the state goes to 6 to exit.

- State 0 Trigger: Low to high transition of *ST Arm Inp ID*
 Logic: Set *ST Cntr Hold* high
 Set *ST Cntr Res* high
 Desc: Need to set the above to the correct encoder hold and reset inputs.
 Make sure the counter is scaled and enabled.
- State 1 Trigger: State 0 and *ST Edge In IP* is low
 Logic:
 Desc: Wait for sheet edge to go low to get the next sheet.
- State 2 Trigger: State 1 and *ST Edge In IP* is high
 Logic: Set *ST Cntr Hold* low
 Set *Ramt to 0* High
 Set Decel time = *ST Slow Dec ID*
 Desc: Got sheet edge start slowing down slowly and start counter.

- State 3 Trigger: State 2 and *ST Counter ID* > *ST Cnts Stpt*
 Logic: Set Decel time = *ST Fast Dec ID*
 Set *ST Fire OUT* high
 Start Decel wait timer
 Desc: Delay time is complete; fire fingers and ramp fast down.
- State 4 Trigger: State 3 and Decel wait timer > *ST DeceTim ID*
 Logic: Set Accel time = *ST Fast Acc ID*
 Set *ST Fire OUT* low
 Start Accel wait timer
 Set *Ramt to 0* High
 Desc: Done. Retract fingers and accel fast.
 Note each tick in the timer is equal to 2 ms.
- State 5 Trigger: State 4 and Accel wait timer > *ST Accel Tim ID*
 Logic: Set Accel time = *ST Slow Acc ID*
 Desc: Go to slow accel ramp after time is up.
 Note each tick in the timer is equal to 2 ms.
- State 6 Trigger: State 5 and Ramp has stopped
 Logic: Reset Accel and Decel times
 Set *Ramt to 0* low
 Set *ST Fire OUT* low
 Desc: Wait for next arm.

AVTRON ACCEL500 STOP TAPE APPLICATION SOFTWARE Part Number 695117.V10

SECTION I

INTRODUCTION AND GENERAL INFORMATION

The ACCel500 Stop Tape software is a standard application used by Avtron for many applications. It offers several configuration options and adapts to many processes.

Following is a list of the major software features.

Communications options:

- Ethernet (Modbus TCP, Ethernet IP, EGD)
- Devicenet
- Profibus DP
- Modbus
- System Bus (Fiber)

Reference location options:

- Fixed value
- Analog input
- Digital Increase/Decrease
- Communications
- Frequency

Speed reference features:

- Run, Thread, Jog Forward, Jog Reverse logic
- Reverse command
- Ramp with programmable rates and S-curves
- Ramp hold
- Master/Slave
- Ratio/Difference draw control
- Skip frequencies
- Speed step input

Speed loop:

- PI regulator
- Inertia compensation
- Current limit control
- Non-linear gains

Outer loop (Tension loop):

- Running/Stall tension ramping
- Bumpless transition in and out of control
- Tension loss and over tension protection
- Dancer slack control
- Output as speed trim, analog output or torque control

Spare operation blocks:

- Variety of logic blocks including , Ands, Ors, Inverts, and latches
- Comparitors
- Non-linear table functions
- Switches
- Gains

Firmware Options enabled

- Start Wizard
- Identification (Motor and torque loop tuning)
- Motor control
 - Volt/Hertz
 - Open loop vector
 - Closed loop vector
- Induction/Permanent magnet motors
- Extended speed range to 320 Hz
- Non-linear gains for extended speed range
- Fault FIFO
- Signal analyzer with trigger

SECTION II

SELECTING THE CONTROL MODE

The drive can be commanded to run from three distinct locations:

- Remote (from I/O or communications)
- Local drive keypad
- Computer diagnostic software

The drive out of the box is defaulted to the local mode. When the mode is changed, it is stored even through power failure (retentive).

The drive is set up so control location can not be switched while the drive is running (*MC Run* is TRUE).

2-1 REMOTE OPERATION

To transfer to remote operation, press the **loc/rem** button on the keypad while the drive is not running. The remote green LED should be on and the display should have the message “I/O term” displayed. If the **loc/rem** button is pressed while running in remote mode, the display will flash “Locked while RUNNING”.

Pressing the **start** button on the keypad will display a message “Keypad Control NOT ACTIVE”

Control Place = 0 in this mode.

For Stop Tape software, the first digital input is defaulted for RUN command and *Run Stpt* is the speed reference.

2-2 LOCAL DRIVE KEYPAD

To transfer to local operation, press the **loc/rem** button on the keypad while the drive is not running. The local green LED should be on and the display should have the message “Keypad” displayed.

If the **loc/rem** button is pressed while running in local mode the display will flash “Locked while RUNNING”.

The **start/stop** buttons will now work and the drive will run at the entered keypad reference setpoint.

Set the keypad control parameters (Keypad Speed Direction, Keypad Speed Reference, Keypad Torque Direction, and Keypad Torque Reference) using menu M3 (Keypad Control).

If keypad communications goes down while in the local mode, the drive will fault (Keypad Comm).

Control Place = 1 in this mode.

2-3 PC CONTROL (COMPUTER DIAGNOSTIC SOFTWARE ADDaptACC)

The drive must be off before the PC Control check box from the diagnostic software is checked to go into computer control. If the box is checked while running, control will not be transferred until the run is removed and the box is re-checked.

While in computer control, both the local and remote LEDs will flash along with the two display messages.

If computer communications goes down while in PC control, the drive will fault (Keypad Comm). When the fault is reset, control will revert to the previous control mode (local or remote).

Once in computer control, the drive can be started/stopped by the control buttons.

Control Place = 2 in this mode.

SECTION III

KEYPAD AND PARAMETER DESCRIPTIONS

3-1 ACCel500 KEYPAD OPERATION

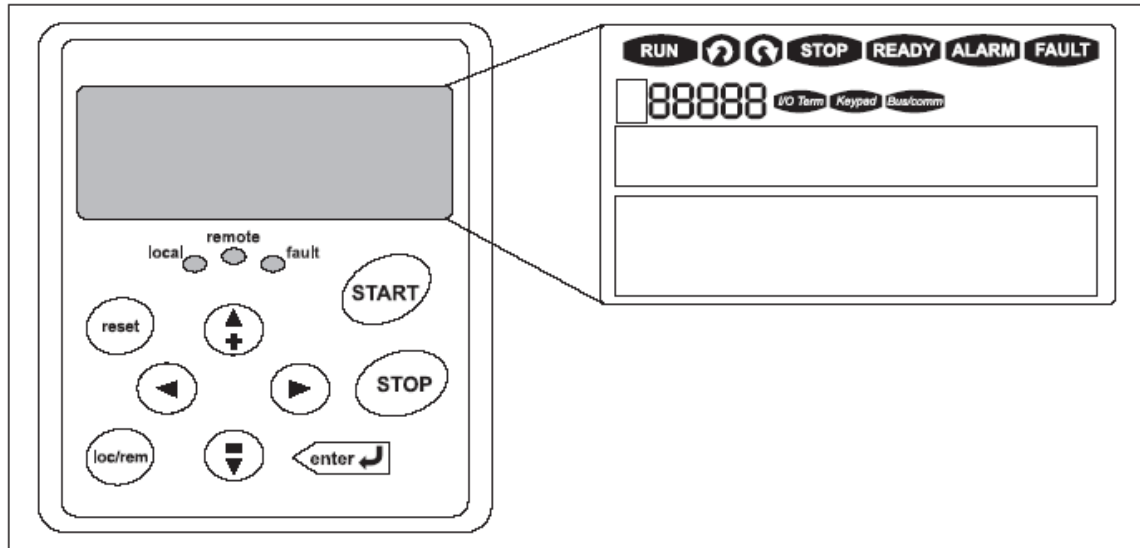


Figure 3-1. Keypad and Display

TABLE 3-1. NAVIGATION BUTTONS

Button	Description
	Start This button operates as the START button for normal operation when “local” is selected as the active control.
	Enter This button is used in the parameter edit mode to save the parameter setting and move to the next parameter ... - to reset the Fault History if pressed while in the “Fault History” menu. - to confirm the acceptance of a change. - to change a virtual button status while in the “Button” menu. - to confirm the start-up list at the end of the Start-Up Wizard. - when the “Operate” menu is active, to exit the “Operate” submenu.
	Stop This button has two integrated operations. The button operates as STOP button during normal (local) operation ... - motor STOP from the keypad - used to reset the active faults. Note that if the STOP button is depressed for 3 seconds, a Stop Fault will occur in any control mode.
	Reset Resets the active faults.
	Local/Remote Switches between LOCAL and REMOTE control for start, speed reference and reverse functions.
	Left Arrow - navigation button, movement to left. - in parameter edit mode, exits mode, backs up one step. - cancels edited parameter (exit from a parameter edit mode). - When in “Operate” menu, will move backward through menu. - At end of “Start-Up Wizard”, repeats the “Start-Up Wizard” setup menu.
	Right Arrow - navigation button, movement to right. - enter parameter group mode. - enter parameter mode from group mode.
	Up and Down Arrows - move either up or down a menu list to select the desired menu item. - editing a parameter/password, while the active digit/character is scrolled. - increase/decrease the reference value of the selected parameter. - in the “Operate” menu, will cause the display of the current reference source and value and allow its change if the keypad is the active reference source. Used to set the password (if defined) when leaving the “Operate” menu. - scroll through the “Active Faults” menu when the ACCel500 is stopped.

TABLE 3-2. LCD STATUS INDICATORS

Indicator	Description
	Run Indicates that the ACCel500 is running and controlling the load. Blinks when a stop command has been given but the ACCel500 is still ramping down.
	Counterclockwise Operation The output phase rotation is BAC, corresponding to counterclockwise rotation of most motors.
	Clockwise Operation The output phase rotation is ABC, corresponding to clockwise rotation of most motors.
	Stop Indicates that the ACCel500 is stopped and not controlling the load.
	Ready Indicates that the ACCel500 is ready to be started.
	Alarm Indicates that there is one or more active drive alarm(s).
	Fault Indicates that there is one or more active drive fault(s).
	I/O Terminal* Indicates that the I/O terminals have been chosen for control (remote).
	Keypad* Indicates that the keypad has been chosen for control (local).

*Both “I/O Terminal” and “Keypad” will be on and flashing when ADDaptACC is chosen for control.

TABLE 3-3. LED STATUS INDICATORS

Indicator	Description
local	Local* Indicates that the ACCel500 is ready to be started and operated from the Local mode.
remote	Remote* Indicates that the ACCel500 is operating and controlling the load remotely.
fault	Fault Indicates that there are one or more active drive fault(s).

*Both “local” and “remote” will be flashing when ADDaptACC is chosen for control.

3-2 MENU NAVIGATION

3-2.1 NAVIGATION TIPS

- To navigate within one level of a menu, use the up and down arrows.
- To move deeper into the menu structure and back out, use the right and left arrows.
- To edit a parameter, navigate to show that parameter’s value, and press the right arrow button to enter the edit mode. When in edit mode, the parameter value will flash.

- When in edit mode, the parameter value can be changed by pressing the up or down arrow keys.
- When in edit mode, pressing the right arrow a second time will allow you to edit the parameter value digit by digit.
- To confirm the parameter change, you must press the **enter** button. The value will not change unless the **enter** button is pushed.
- Some parameters can not be changed while the ACCel500 drive is running. The screen will display LOCKED if you attempt to edit these parameters while the drive is running. Stop the drive to edit these parameters.
- Appendix B lists all parameters for the application in menu order.

3-2.2 MAIN MENU

The data on the control keypad are arranged in menus and submenus. The first menu level consists of M1 to M8 and is called the Main Menu. The structure of these menus and their submenus is illustrated in Figure 3-2.

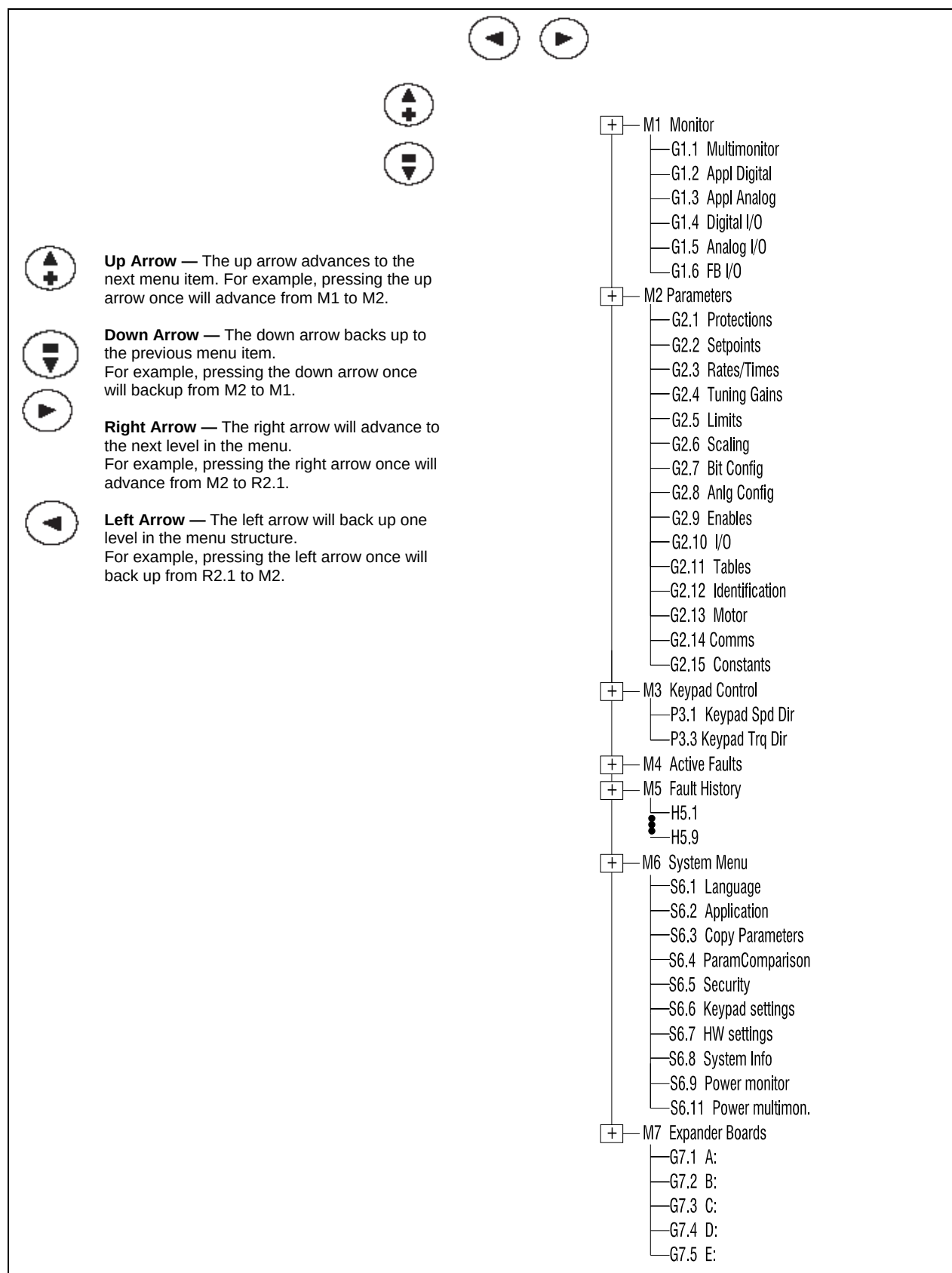


Figure 3-2. Main Menu Navigation

3-2.3 MONITOR MENU (M1)

The Monitoring Menu items are meant for viewing parameter values during operation. Monitored values are updated every 0.3 sec. Monitored items are identified by item numbers V1.1 to V1.xx, where “xx” varies by application.

Monitored parameters are not editable from this menu (See Parameter Menu [M2] to change parameter values).

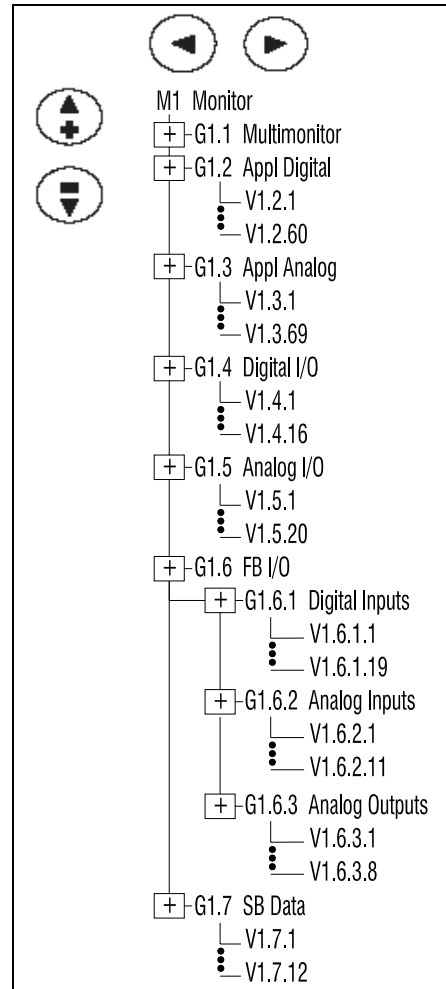


Figure 3-3. Monitor Menu Structure Example

Multimonitor (G1.1)

This parameter allows the viewing and selection (if allowed by System menu item, S6.11) of three simultaneously monitored items from the Monitored Menu Items. Use the right arrow key to select the item to be modified and then the up or down arrow keys to select the new item. Press the **enter** key to accept the change.

3-2.4 PARAMETER MENU (M2)

The Parameter Menu is a single or multi-level menu dependent upon the application in use, arranged by the parameter group items. See Figure 3-4. Parameters and parameter groups are explained in further detail in the ACCel500 Application Manual.

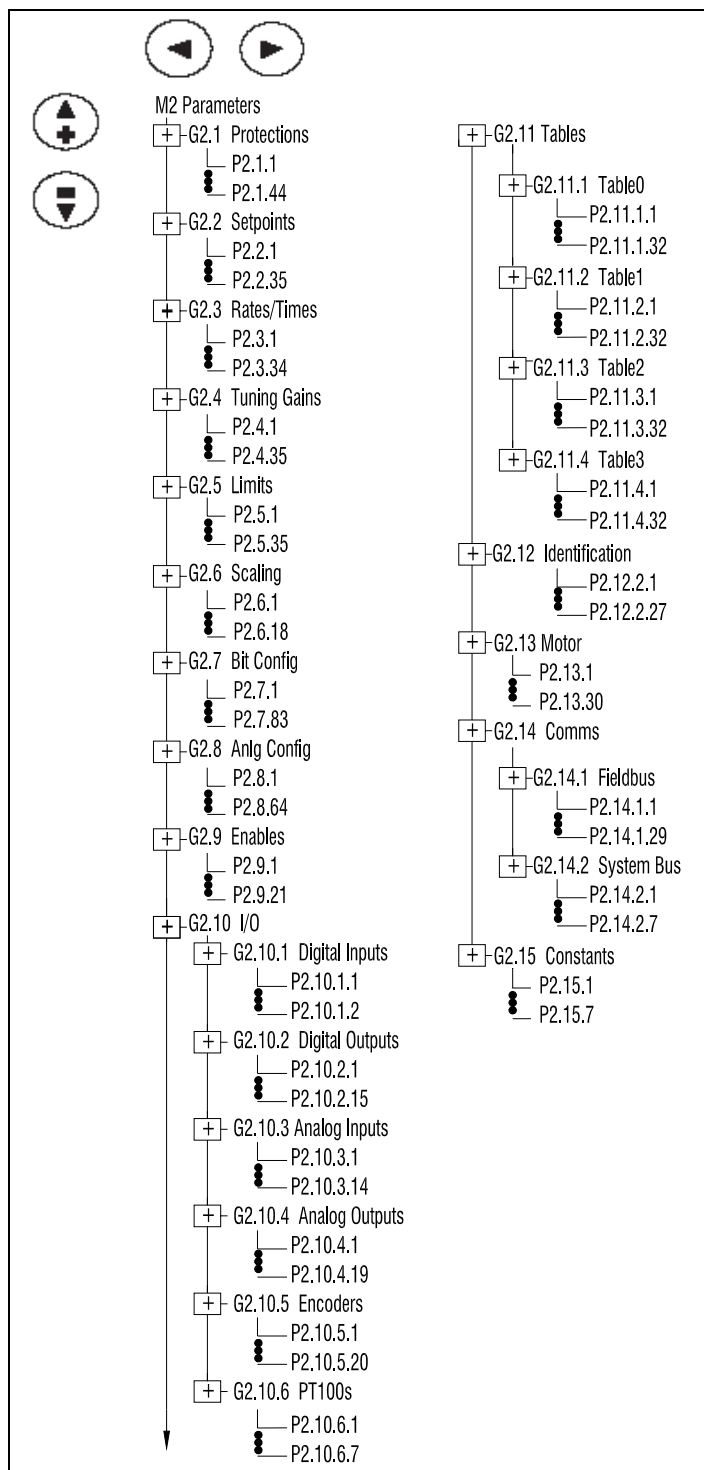


Figure 3-4. Parameter Menu

3-2.5 KEYPAD CONTROL MENU (M3)

In the Keypad Control Menu, you can set the frequency reference, choose the motor direction for keypad operation when “local” mode is in operation. See Figure 3-5.

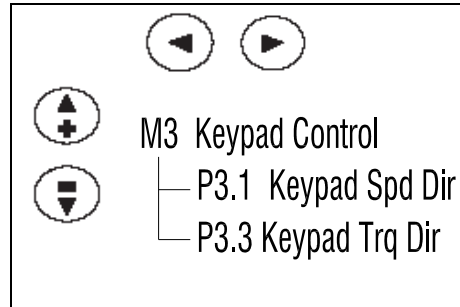


Figure 3-5. Keypad Control Menu

P3.1 Range: Forward, Reverse
Keypad Spd Dir

This allows the operator to change the rotation direction of the motor. This setting will not influence the rotation direction of the motor unless the keypad has been selected as the active control place.

P3.3 Range: Forward, Reverse
Keypad Trq Dir

3-2.6 ACTIVE FAULTS MENU (M4)

When a fault occurs, the ACCel500 drive stops. The sequence indication F1, the fault code, a short description of the fault and the fault type symbol will appear on the display. In addition, the indication FAULT or ALARM is displayed and, in case of a FAULT, the red LED on the keypad starts to blink. If several faults occur simultaneously, the sequence of active faults can be browsed with the Browser buttons. See Figure 3-6.

The active faults memory can store the maximum of 10 faults in the sequential order of appearance. The fault remains active until it is cleared with either the STOP or **reset** buttons or with a reset signal from the I/O terminal. Upon fault reset the display will be cleared and will return to the same state it was before the fault trip.

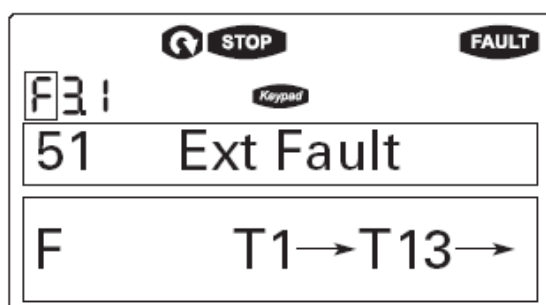


Figure 3-6. Active Fault Display Example

WARNING

Remove any External Start signals or permissives before resetting the fault to prevent an unintentional restart of the ACCel500, which could result in personal injury or equipment damage.

Fault Type Range: A, F, AR, FT

There are four different types of faults. See Table 3-4.

TABLE 3-4. FAULT TYPES

Fault Type	Fault Name	Description
A	Alarm	This type of fault is a sign of an unusual operating condition. It does not cause the drive to stop, nor does it require any special actions. The “A fault” remains in the display for about 30 seconds.
F	Fault	An “F fault” is a kind of fault that makes the drive stop. Actions need to be taken in order to restart the drive.
AR	Auto-Restart Fault	If an “AR fault” occurs the drive will also stop immediately. The fault is reset automatically and the drive tries to restart the motor. If the restart is not successful, a fault trip (FT) occurs.
FT	Fault Trip	If the drive is unable to restart the motor after an AR fault, an FT fault occurs. The effect of the “FT fault” is the same as that of the F fault — the drive is stopped.

Fault Code Range: 1 – 54

Fault codes indicate the cause of the fault. A list of fault codes, their descriptions, and possible solutions can be found in Appendix E — Application-Specific Faults.

Fault Time Range: T.1 – T.13

Data Record In this menu, important data recorded at the time the fault is available. This feature is intended to help the user or the service person to determine the cause of fault. Table 3-5 indicates the information that is recorded.

TABLE 3-5. FAULT TIME DATA

Data	Units	Description
T.1 ¹	D	Counted operation days (Fault 43: Additional code)
T.2 ¹	hh:mm:ss (d)	Counted operation hours (Fault 43: Counted operation days)
T.3	Hz hh:mm:ss	Output frequency (Fault 43: Counted operation hours)
T.4	A	Motor current
T.5	V	Motor voltage
T.6	%	Motor power
T.7	%	Motor torque
T.8	V	DC bus voltage
T.9	°C	Unit temperature
T.10	—	Run status
T.11	—	Direction
T.12	—	Warnings
T.13	—	Zero speed

¹Real time record.

3-2.7 FAULT HISTORY MENU (M5)

All faults are stored in the Fault History Menu, which can be viewed by using the Browser buttons. Additionally, the Fault time data record pages are accessible for each fault as in the Active Faults Menu described above. See Figure 3-7.

The ACCel500 drive's memory can store a maximum of 30 faults, in the order of appearance. If there are 30 uncleared faults in the memory, the next occurring fault will erase the oldest fault from the memory.

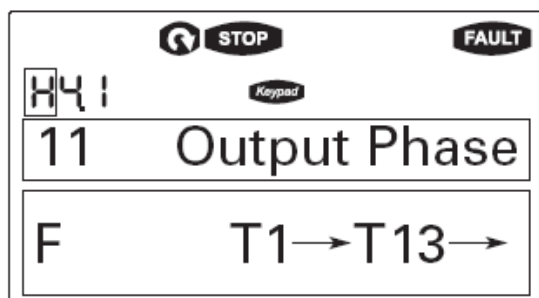


Figure 3-7. Sample Fault History Display

3-2.8 SYSTEM MENU (M6)

The controls associated with the general use of the drive, such as application selection, customized parameter sets or information about the hardware and software are located in the System Menu. Password protection can be activated by parameter P6.5.1.

Descriptions of the system menu parameters are illustrated in Figure 3-8.

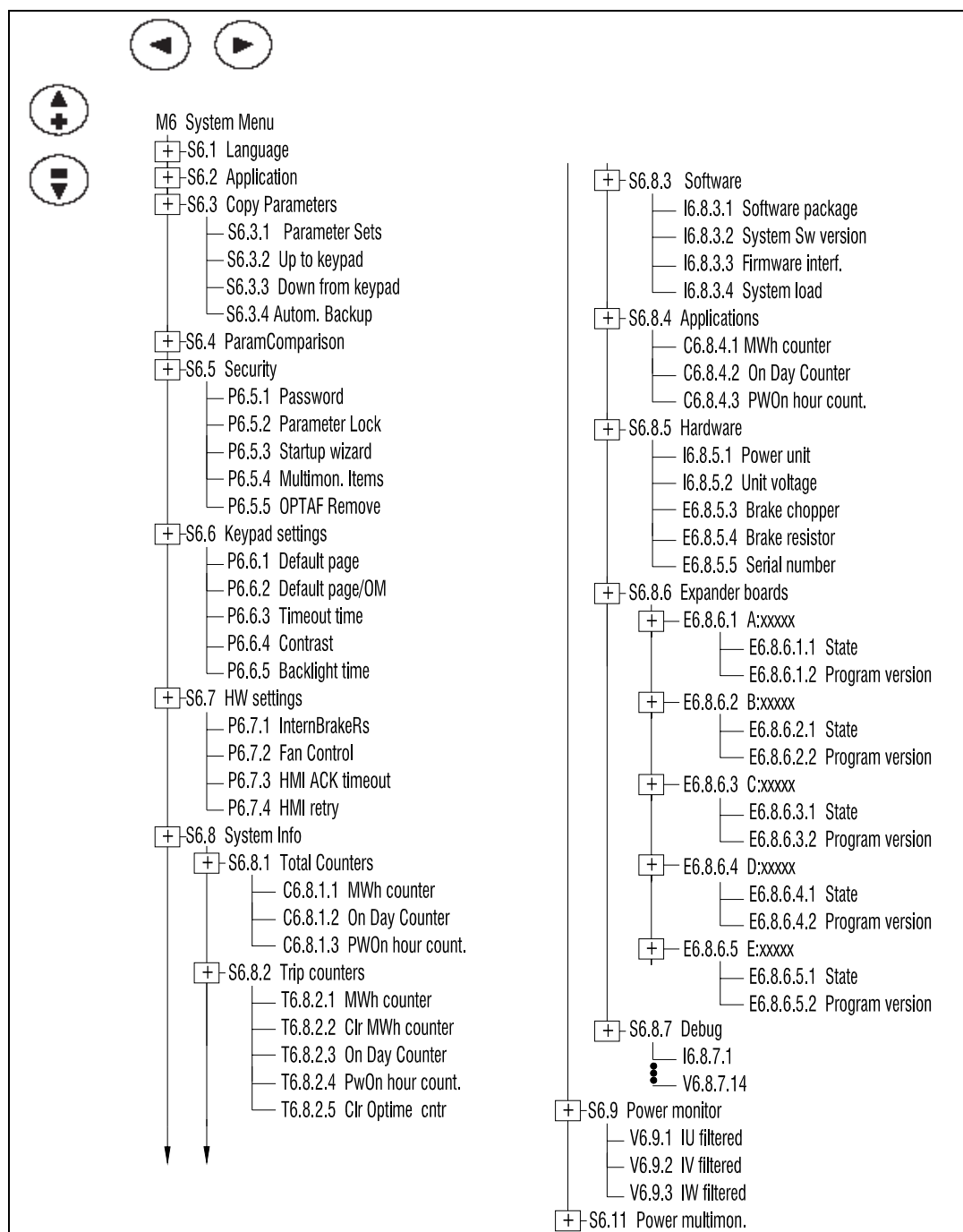


Figure 3-8. System Menu Structure

System Menu Parameters

S6.1 Range: English Default: English
Language Selection This parameter offers the ability to control the ACCel500 through the keypad in the language of your choice.

S6.2 Range: Spd /Ten
Application This parameter sets the active application.
 When changing applications, you will be asked if you want the parameters of the new application to be uploaded to the keypad. If you wish to load the new application parameters, push the **enter** button. Pushing any other button saves the parameters of the previously used application in the keypad.

Parameter Comparison Options (S6.4)

S6.4
Parameter Comparison With the Parameter Comparison function, you can compare the actual parameter values to the values of your customized parameter sets and those loaded to the control keypad.

The actual parameter values are first compared to those of the customized parameter Set1. If no differences are detected, a “0” is displayed on the lowermost line of the keypad.

If any of the parameter values differ from those of the Set1 parameters, the number of the deviations is displayed together with symbol P (e.g. P1 →P5 = five deviating values).

By pressing the right arrow button once again, you will see both the actual value and the value it was compared to. In this display, the value on the Description line (in the middle) is the default value, and the one on the value line (lowermost line) is the edited value. You can also edit the actual value by pushing the right arrow button.

Actual values can also be compared to Set2, Factory Settings and the Keypad Set values.

Security Parameter Options (S6.5)

The Security submenu is protected with a password. Store the password in a safe place.

S6.5.1 Range: 0 – 65535 Default: 0
Password The application selection can be protected against unauthorized changes with the Password function. When the password function is enabled, the user will be prompted to enter a password before application changes, parameter value changes, or password changes.

By default, the password function is not in use. If you want to activate the password, change the value of this parameter to any number between 1 and 65535. The password will be activated after the Timeout time (Timeout Time) has expired.

To deactivate the password, reset the parameter value to 0.

P6.5.2 Parameter Lock	Range: ChangeEnable, ChangeDisabl This function allows the user to prohibit changes to the parameters. If the parameter lock is activated, the text *locked* will appear on the display if you try to edit a parameter value. This function does not prevent unauthorized editing of parameter values.	Default: ChangeDisabl
P6.5.3 Start-up Wizard	Range: Yes, No The Start-Up Wizard facilitates commissioning the ACCel500. If selected active, the Start-Up Wizard prompts the operator for the language and application desired and then advances through the start-up parameter list. After completion, it allows the user to repeat the Start-Up Wizard or return to the default page, the Operate Menu. The Start-Up Wizard is always active for the initial power up of the ACCel500.	Default: No
P6.5.4 Multimon. Items	Range: ChangeEnable, ChangeDisabl The keypad display can display three actual monitored values at the same time. This parameter determines if the operator is allowed to replace the values being monitored with other values.	Default: ChangeEnable

Keypad Settings (S6.6)

There are five parameters (Default Page to Backlight Time) associated with the keypad operation:

P5.6.1 Default page	Default: 0 This parameter sets the view to which the display automatically moves as the Timeout Time expires or when the keypad power is switched on. If the Default Page value is 0, this function is not activated, i.e., the last displayed page remains on the keypad display.
P5.6.2 Default page/OM	Here you can set the location in the Operating menu to which the display automatically moves as the set Timeout Time expires, or when the keypad power is switched on. See setting of Default Page parameter above.
P5.6.3 Timeout time	Range: 0 – 65535 Units: Seconds Default: 30 The Timeout Time setting defines the time after which the keypad display returns to the Default Page. If the Default Page value is 0, the Timeout Time setting has no effect.
P5.6.4 Contrast	If the display is not clear, you can adjust the keypad contrast with this parameter.
P5.6.5 Backlight time	Range: 1 – 65535 or Forever Units: Minutes Default: 10 This parameter determines how long the backlight stays on before going out. You can select any time between 1 and 65535 minutes or “Forever”.

Hardware Settings (S6.7)

The Hardware Settings submenu (S6.7) provides parameters for setting information on Internal brake resistor connection, Fan control, Keypad acknowledge timeout and Keypad retries.

P6.7.1 InternBrakeRs Range: Connected – Not Connected Default: Connected
With this function you tell the ACCel500 whether the internal brake resistor is connected or not.

If your drive has an internal brake resistor, the default value of this parameter is “Connected”. However, if it is necessary to increase braking capacity by installing an external brake resistor, or if the internal brake resistor is disconnected, it is advisable to change the value of this function to “Not Connected” in order to avoid unnecessary fault trips.

The brake resistor is available as an option for all drives. It can be installed internally in frame sizes FR4 to FR6.

P6.7.2 Fan Control Range: Continuous, Temperature Default: Continuous
This function sets the control method of the ACCel500 drive’s cooling fan. You can set the fan to run continuously when the power is switched on or to run based on the temperature of the unit. If the latter function has been selected, the fan is switched on automatically when the heatsink temperature reaches 60°C. The fan receives a stop command when the heatsink temperature falls to 55°C. The fan runs for about a minute after receiving the stop command or switching on the power, as well as after changing the value from “Continuous” to “Temperature”.

The fan runs continuously, regardless of this setting, when the ACCel500 drive is in RUN state.

P6.7.3 HMI ACK timeout Range: 200 – 5,000 Default: 200
Keypad Units: ms
This function allows the user to change the timeout of the Keypad acknowledgement time.

If the ACCel500 drive has been connected to a PC with a serial cable, the default values of Keypad Acknowledge Timeout and Number of Retries to Receive Keypad Acknowledgement must not be changed.

If the ACCel500 drive has been connected to a PC via a modem and there is delay in transferring messages, the value of Keypad Acknowledge Timeout must be set according to the delay as follows:

Example:

- Transfer delay between the ACCel500 drive and the PC is found to be = 600 ms
- The value of Keypad Acknowledge Timeout is set to 1200 ms (2 x 600, sending delay + receiving delay)
- The corresponding setting is then entered in the [Misc] section of the file ACCELDRIVE.INI:
Retries = 5
AckTimeOut = 1200
TimeOut = 5000

It must also be considered that intervals shorter than the Keypad Acknowledge Timeout time cannot be used in ACCel500 drive monitoring.

- P6.7.4** Range: 1 – 10 Default: 5
- HMI retry** With this parameter, you can set the number of times the drive will try to receive an acknowledgement when it has not been received within the acknowledgement time (Keypad Acknowledge Timeout) or if the received acknowledgement is faulty.

System Information (S6.8)

This section contains hardware and software information as well as operation information.

S6.8.1

Total Counters In the Total Counters page you will find information related to the ACCel500 operating times, i.e., the total numbers of MWh, operating days, and operating hours. See Table 3-6.

Unlike the counters for the Trip Counters, these counters cannot be reset.

The Power On time counters, days and hours, operate whenever power is applied to the ACCel500 drive.

TABLE 3-6. TOTAL COUNTERS

Number	Name	Description
C6.8.1.1	MWh counter	Megawatt hours total operation time counter
C6.8.1.2	On Day counter	Number of days the ACCel500 drive has been supplied with power
C6.8.1.3	PWOn hour count.	Number of hours the ACCel500 drive has been supplied with power

S6.8.2

Trip counters The Trip Counters are counters whose values can be reset to zero. The resettable counters are shown in Table 3-7.

TABLE 3-7. TRIP COUNTERS

Number	Name	Description
T5.8.2.1	MWh counter	Megawatts hours since last reset
P5.8.2.2	Clear MWh counter	Resets megawatts hours counter
T5.8.2.3	Power On day counter	Number of days the ACCel500 drive has been run since the last reset
T5.8.2.4	Power On hour counter	Number of hours the ACCel500 drive has been run since the last reset
P5.8.2.5	Clr Optime cntr	Resets the operating day and hour counters

Note: The Trip Counters operate only when the motor is running.

S6.8.3

Software The Software information page includes information on the following software related topics:

TABLE 3-8. SOFTWARE INFORMATION

Number	Name	Description
I6.8.3.1	Software package	ACC00031V003
I6.8.3.2	System Sw version	11.53.6536
I6.8.3.3	Firmware interf.	4.37
I6.8.3.4	System load	G9.1

S6.8.4

Applications The Application information page includes information on not only the application currently in use but also all other applications loaded into the ACCel500. The information available is shown in Table 3-9. Note that the “x” in the table refers to the sequential number of the application in the list.

TABLE 3-9. APPLICATIONS INFORMATION

Number	Content
A6.8.4.x	Application name
D6.8.4.x.1	Application ID
D6.8.4.x.2	Version
D6.8.4.x.3	Firmware interface

S6.8.5

Hardware The Hardware information page provides information on the following hardware-related topics.

TABLE 3-10. HARDWARE INFORMATION

Number	Content
I6.8.5.1	Number of the power unit
I6.8.5.2	Nominal voltage of the unit
I6.8.5.3	Brake chopper
I6.8.5.4	Brake resistor
I6.8.5.5	Serial Number

S6.8.6

Expander boards This parameter and its sub-items provide information about the basic and option boards plugged into the control board as shown in Table 3-11. Note that the “x” in the table refers to the sequential number of the slot, with slot A being “1” and slot E being “5”.

TABLE 3-11. EXPANDER BOARD INFORMATION

Number	Content
E6.8.6.x	Slot “x” board identification
E6.8.6.x.1	Operating state
E6.8.6.x.2	Software version

S6.8.7 Debug Menu

This menu is meant for advanced users and application designers. Contact the factory for any assistance needed.

Power Monitor (S6.9)

This menu shows the actual filtered current in amps.

TABLE 3-12. POWER MONITOR INFORMATION

Number	Content
C6.9.1	IU filtered
C6.9.2	IV filtered
C6.9.3	IW filtered

3-2.9 EXPANDER BOARD MENU (M7)

The Expander Board Menu makes it possible for the user:

- to see what expander boards are connected to the control board and
- to access and edit the parameters associated with the expander board.
- to monitor option board values.

Each option board has its own set of parameters.

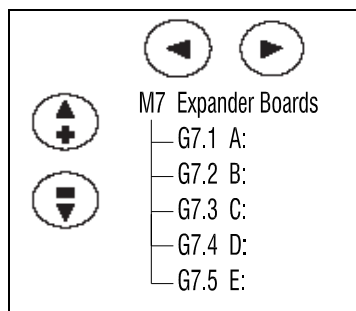


Figure 3-9. Expander Board Menu Structure

Example of Expander Board Parameters for Option Board A9

P7.1.1.1	Range: 1 – 5	Default: 3
AI1 Mode	Analog Input 1 input options:	
1	0 to 20 mA	
2	4 to 20 mA	
3	0 to 10V	
4	2 to 10V	
5	-10 to +10VP	
P7.1.1.2	Range: 1 – 5	Default: 1
AI2 Mode	Analog Input 2 input options:	
1	0 to 20 mA	
2	4 to 20 mA	
3	0 to 10V	
4	2 to 10V	
5	-10 to +10VP	
P7.1.1.3	Range: 1 – 4	Default: 1
AO1 Mode	Analog Output 1 output options:	
1	0 to 20 mA	
2	4 to 20 mA	
3	0 to 10V	
4	2 to 10V	

3-2.10 EDITING A NUMERIC VALUE

Use the following procedure to edit numeric parameter values.

1. To edit a parameter, navigate to show that parameter and its value.
2. Press the right arrow button to enter the edit mode. In edit mode, the parameter value will flash.
3. Pressing the up or down arrow keys to change the parameter value.

If you press the right arrow a second time, the leftmost digit of the parameter value will flash. You can then use the up or down arrow keys to change the value of the flashing digit.

Press the right arrow again to select the next digit, and repeat the process to change the rest of the digits in the parameter value.

4. When you are finished, you must press the **enter** button to confirm the parameter change. **The new value will not be saved unless the enter button is pushed.**

3-2.11 EDITING A CONFIGURATION VALUE

A configuration parameter gets its data from the parameter whose ID number you enter here. Parameter ID numbers are listed in Appendix D.

Configuration parameters can have values ranging from 1 to 2000. Values 1 to 1000 indicate firmware values; values 1001 to 2000 indicate application values.

Use the following procedure to edit configuration parameter values.

1. To edit a parameter, navigate to show that parameter and its value.
2. Press the right arrow button to enter the edit mode. In edit mode, the parameter value will flash.
3. Pressing the up or down arrow keys to change the parameter value.

If you press the right arrow a second time, the rightmost digit of the parameter value will flash. You can then use the up or down arrow keys to change the value of the flashing digit.

Press the left arrow to select the next digit, and repeat the process to change the rest of the digits in the parameter value.

4. When you are finished, you must press the **enter** button to confirm the parameter change. **The new value will not be saved unless the enter button is pushed.**

3-2.12 EDITING A SELECTION VALUE

Some parameter values are displayed as text. For example, parameter S6.1 (Language) can be set to four values: English, Español (Spanish), Français (French), or Português (Portuguese). Use the following procedure to edit a parameter selection value.

1. To edit a parameter, navigate to show that parameter and its value.
2. Press the right arrow button to enter the edit mode. In edit mode, the parameter value will flash.
3. Pressing the up or down arrow keys to change the parameter value.
4. When you are finished, you must press the **enter** button to confirm the parameter change.
The new value will not be saved unless the enter button is pushed.

3-2.13 KEYPAD REMOVAL WHILE DRIVE IS RUNNING

If the keypad is removed while the drive is running, a Keypad Comm fault (52) will result. The drive will also be placed in remote control mode. Clear the Keypad Comm fault by pressing the **reset** button. To restore local keypad control, press the **loc/rem** button.

3-2.14 STOP FAULT

The Keypad **stop** button will fault the drive and operate as a coast stop if held for three seconds, regardless which mode is active.

3-2.15 REMOTE KEYPAD

The Control Keypad is removable. It can be mounted externally and connected with the appropriate cable.

SECTION IV

I/O PARAMETER DESCRIPTIONS

4-1 ANALOG INPUTS

Parameters	Type	Default
<i>AIN3 Slot ID to AIN4 Slot ID</i>	ACFG	0
<i>AIN1 Gain to AIN4 Gain</i>	CAL	1.00
<i>AIN1 Off to AIN4 Off</i>	CAL	0.0
<i>AIN1 Tc to AIN4 Tc</i>	CAL	0.1 seconds
<i>AI1 Type to AI4 Type</i>	APB	
<i>AIN1 to AIN4</i>	APB	
<i>AIN1 Fault to AIN4 Fault</i>	DPB	

Description

Four analog inputs are available in this software. Two of the analog inputs are available with the standard board in slot A. The other two require additional I/O boards to take advantage of them.

The slot ID configures the location of the analog input. The first digit of the ID is the slot location: Slot A-E = 1-5. The second digit is the order of the input on the board. 0 = first analog input. The first two analog inputs are hard set Slot A input 0 and 1.

Before scaling, the value of the analog inputs are scaled 0-10,000; +/-10,000 for +/-10 volt boards.

The Type of board is read from the I/O slot and can be viewed as *AI1 Type -AI4 Type* as follows:

Mode

- 0 = Unknown
- 1 = 0-20 ma
- 2 = 4-20 ma
- 3 = 0-10 V
- 4 = 2-10 V
- 5 = +/-10 V

Scaling for the first analog input is done as follows:

$$\text{Value 1} = (\text{AI 1} \times \text{AIN1 Gain} / 100) + \text{AIN1 Off}$$

AIN1 Tc is a low pass filter on the input, entered in seconds.

AIN1 is the value after scaling and filtering.

AIN1 Fault bit will go high only in modes 2 or 4.

Mode 2 will fault when the input current is less than 4 mA.

Mode 4 will fault when the input voltage is less than 2 V.

4-2 ANALOG OUTPUTS

Parameters	Type	Default
<i>AOUT1 ID</i> to <i>AOUT4 ID</i>	ACFG	3 = <i>Motor Current</i> 2 = <i>Motor Speed</i> 1200, 1200 = <i>Zero-Analog</i>
<i>AOUT1 Zero</i> to <i>AOUT4 Zero</i>	CAL	0.0
<i>AOUT1 Cal</i> to <i>AOUT4 Cal</i>	CAL	1.00
<i>AOUT1 TC</i> to <i>AOUT4 TC</i>	CAL	0.10 seconds
<i>AOUT2 Slot ID</i> to <i>AOUT4 Slot ID</i>	ACFG	0
<i>AOUT1 Val</i> to <i>AOUT4 Val</i>	APB	

Description

Four analog outputs are available in this software. One analog output is available with the standard board in slot A. The other three require additional I/O boards to take advantage of them.

The ID configures which parameter value to map to the analog output.

The slot ID configures the location of the analog output. First digit of the ID is the slot location: Slot A-E = 1-5. Second digit is the order of the output on the board; 0 = first analog output. The first analog output is hard set to Slot A first output.

After scaling, the value can be viewed as *AOUTx Val* with a range of 0-10,000; +/-10,000 for ±10 volt boards.

The Type of board must be known for the scaling factor:

- 0 = Unknown
- 1 = 0-20 mA = 0-10,000 value
- 2 = 4-20 mA = 0-10,000 value
- 3 = 0-10 V = 0-10,000 value
- 4 = 2-10 V = 0-10,000 value
- 5 = +/-10 V = 0-10,000 value

Scaling for the first analog output is done as follows:

$$\text{Value 1} = (\text{AOUT1 ID value} + \text{AOUT1 Zero}) \times \text{AOUT1 Cal} / 100$$

Note: 10,000 is the board's full output.

AOUTx Tc is a low-pass filter on the output entered in seconds.

4-3 DIGITAL INPUTS

Parameters	Type	Default
<i>DIN7 Slot ID to DIN8 Slot ID</i>	ACFG	0
<i>DIN 1 to DIN 8</i>	DPB	
<i>Not DIN 1 to Not DIN 8</i>	DPB	

Description

Eight digital inputs are available in this software. Six digital inputs are available with the standard board in slot A. The other two require additional I/O boards to take advantage of them.

The slot ID configures the location of the digital input. The first digit of the ID is the slot location: Slot A-E = 1-5. The second digit is the order of the input on the board; 0 = first digital input. The first eight digital inputs are hard set to Slot A digital inputs.

The digital inputs and their invert can be viewed as *DIN x* and *Not DIN x*.

4-4 DIGITAL OUTPUTS

Parameters	Type	Default
<i>DOUT1 ID to DOUT6 ID</i>	BCFG	111 6= <i>MC_Fault</i> = Drive fault 1098 = <i>MC_Run</i> = Drive running 1118 = <i>MC_AtSpeed</i> = Not ramping 1002, 1002, 1002 = <i>Zero Bit</i>
<i>DOUT1 Inv to DOUT6 Inv</i>	En	0
<i>DOUT4 Slot ID to DOUT6 Slot ID</i>	ACFG	0

Description

Six digital outputs are set up in the software. Three digital outputs are available with the standard board in slot A or B. The other three require additional I/O boards to take advantage of them.

The ID configures which parameter to map to the digital output.

The slot ID configures the location of the digital output. The first digit of the ID is the slot location: Slot A-E = 1-5. The second digit is the order of the output on the board; 0 = first digital output. The first three digital outputs are hard set to the default boards (One output in slot A and two in slot B).

The value bit can be inverted before being sent out by *DOUTx_Inv* parameters.

4-5 ENCODER COUNTER OUTPUTS

Parameters	Type	Default
<i>Enc1 Slot ID, Enc2 Slot ID</i>	ACFG	0
<i>Enc1 Mlt, Enc2 Mlt</i>	CAL	1000
<i>Enc1 Div, Enc2 Div</i>	CAL	1000
<i>C_Enc2_Add</i>	CAL	0
<i>Enc1 Tc, Enc2 Tc</i>	CAL	1 ms
<i>Counter1 Dec, Counter2 Dec</i>	CAL	0
<i>Counter1 Mult, Counter2 Mult</i>	CAL	1
<i>Counter1 Hld, Counter2 Hld</i>	BCFG	1002 (Zero Bit)
<i>Counter1 Res, Counter2 Res</i>	BCFG	1002 (Zero Bit)
<i>Counter1, Counter2</i>	En	0 (Disabled)
<i>Encoder1FiltTime</i>	Cal	1 ms
<i>Enc1_Out, Enc2_Out</i>	APB	
<i>Counter1, Counter2</i>	APB	

Frequency Description:

Two encoder inputs are available in this software, but require additional option boards to enable.

When closed loop speed control is requested, the first encoder feedback is always selected for speed feedback. This is taken from the board, and is not affected by the parameter scalings.

The slot ID configures the location of the encoder input. First digit of the ID is the slot location: Slot A – E = 1 – 5. Second digit is the order of the output on the board. 0 = first encoder input. On option board A7, the second frequency input is input 3 of the board.

The frequency feedback is scaled by the option board by entering the proper PPR in the option board parameters. It is assumed that the encoder is mounted directly to the motor with no gear ratio and value read from the board is in motor rotation in hertz for speed feedback.

$$\text{Value from board} = \frac{(\text{Frequency Hz}) \times (60 \text{ s/m}) \times (\text{Nominal motor frequency Hz})}{(\text{PPR}) \times (\text{Nominal motor speed RPM})}$$

Both frequency feedbacks can be scaled and filtered and used for other functions such as speed reference.

Enc1_Out = first encoder input scaled by (motor Hz x *Enc1 Mult* / *Enc1 Div*) with a low pass filter of time constant *Enc1 Tc*.

Enc2_Out = second encoder input scaled by ((motor Hz + *Enc2 ADD*) x *Enc2 Mult* / *Enc2 Div*) with a low pass filter of time constant *Enc2 Tc*.

Counter Description:

Both encoder inputs have pulse counters associated with them. These are bi-directional counters with hold and reset bits. The values of the counters will be stored and recalled through drive power loss (retentive).

Three words read from the encoder board contain the raw motor rotations. The first two offer complete revolution counter and the third is the fraction of rotation.

$Counter1 = \text{Motor rotations} \times Counter1 \text{ Mult} / Counter1 \text{ Dec}$

$Counter2 = \text{Motor rotations} \times Counter2 \text{ Mult} / Counter2 \text{ Dec}$

Counter1 Hld, *Counter2 Hld* will hold their respective counters at their current count when high.

Counter1 Res, *Counter2 Res* will reset their respective counters to zero when high.

4-6 DRIVE HARDWARE INPUTS

Parameters	Type	Description
<i>Motor Torque</i>	APB	Percent of motor
<i>Motor Voltage</i>	APB	Volts
<i>Motor Power</i>	APB	Percent of motor
<i>Motor Current</i>	APB	Amps
<i>Unit Temperature</i>	APB	C.

SECTION V

LOGIC SEQUENCE

5-1 MISCELLANEOUS LOGIC

Zero Bit - Set to FALSE. ID number for this bit is 1002.

One Bit - Set to TRUE. ID number for this bit is 1001.

Zero Analog = 0

One Analog = 1

Int Ten = 10

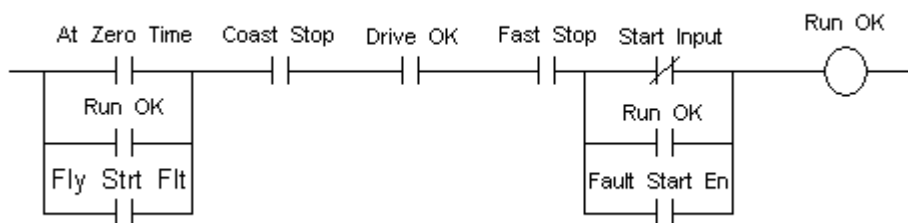
Int Hundred = 100

Int Thousand = 1000

5-2 REMOTE OPERATION (See Appendix A-5)

There are four basic run commands for the ACCel500 drive. Run and thread are maintained. Jog forward and Jog reverse are momentary.

5-2.1 Run OK



The *Run OK* bit is used to stop the drive in any control mode.

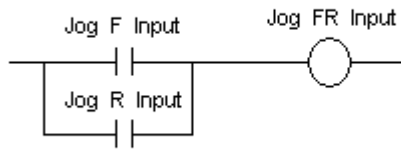
If the *Fly Start Flt* bit is enabled, then the drive can be restarted after a fault without first going to zero speed. This may be helpful for sections such as dryer helpers that get dragged along with the machine.

The *Fault Start En* bit allows the drive to start running as soon as the fault is cleared. If it is disabled, the Runs must first be removed before they can be energized again. This bit should be disabled when the runs come from a communication port rather than direct I/O. This will force the communications to come up and remove the runs before you can safely run.

The internal *MC Ready* is tied to the firmware *Drive OK* variable.

Coast Stop and *Fast Stop* are defaulted to *One Bit*.

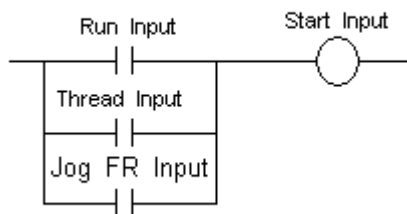
5-2.2 Jog FR Input



The *Jog FR Input* is active when either of the Jog inputs are a TRUE.

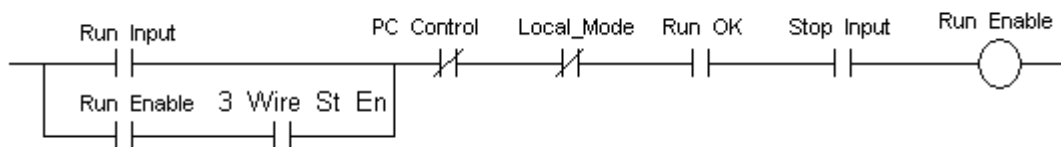
Jog F Input is defaulted to the second digital input. *Jog R Input* is defaulted to *Zero Bit*.

5-2.3 Start Input



Start Input is TRUE when any of the drive run inputs are active.

5-2.4 Run Enable

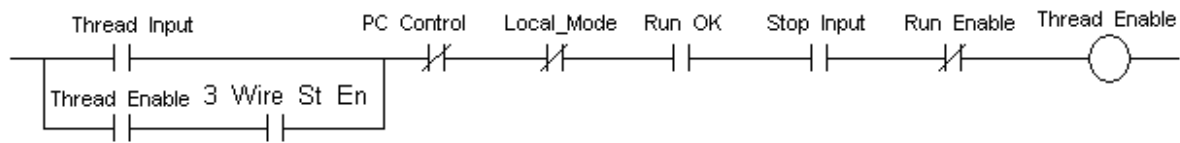


The *Run Input* will energize the *Run Enable* if all interlocks are met.

The *Stop Input* defaults to TRUE. This can be set to a normally closed stop input along with enabling the *3 Wire St En* to implement a three wire start/stop circuit.

Run Input is defaulted to the first digital input.

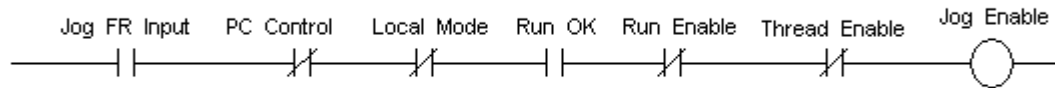
5-2.5 Thread Enable



Thread Enable is setup similar to the *RunEnable*. *Run_Enable* takes priority. If in Thread and the *Run_Input* goes high the control will transfer to the Run mode.

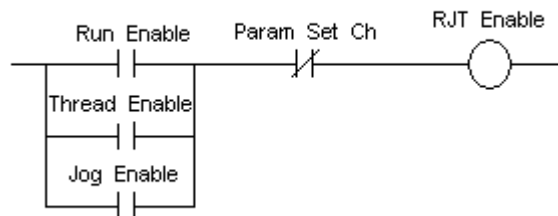
Thread Input is defaulted to *Zero Bit* which disables this function.

5-2.6 Jog Enable



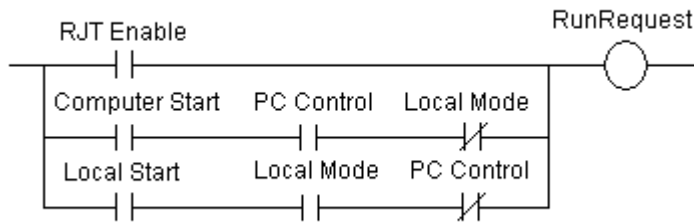
The *Jog Enable* is not maintained. Removing the input turns off the enable. Also, Thread and Run Enables have a higher priority.

5-2.7 RJT Enable



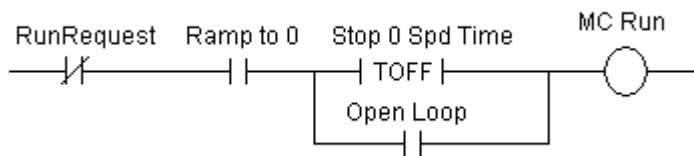
RJT Enable is high if any of the modes are enabled and the drive is done with a parameter change. This makes sure all proper values are in place before proceeding.

5-2.8 RunRequest



RunRequest is high if *RJT Enable* is High or if the drive is commanded to run from either the local mode or computer ADDaptACC mode.

5-2.9 MC Run



RunRequest sets *MC Run* which is sealed in until the drive ramps to zero speed. Also in closed loop mode *MC Run* can be set to stay enabled keeping the drive running at zero speed for *Stop 0 Spd Time* in seconds.

5-2.10 Cntrl Inhib

Cntrl Inhib is the invert of *MC Run*.

5-2.11 Fast Stop

When *Fast stop* input goes low, the drive will stop at its fast ramp rate. This is defaulted to *One Bit*.

5-2.12 Coast Stop

The drive will coast stop under the following conditions:

- Not in *PC Control* and *Coast Stop* goes low.
- In *PC Control* and the user presses the coast stop button in ADDaptACC.
- Drive faults out and the response is setup for coast stop.
- Removal of the run if the *Stop Funct* parameter is set to Coast.

5-2.13 *Cntrl Mode*

Cntrl Mode is an integer based on the following:

- 0 = Not enabled
- 1 = *Run Enable*
- 2 = *Thread Enable*
- 3 = *Jog F En*
- 4 = *Jog R En*

This is used for the reference select blocks.

5-2.14 Ramp Delays

Two delays are available when operating in the closed loop mode.

- *Strt 0 Spd Time* will hold the speed ramp at zero until it times out on a start command. This value is in ms. This is used to allow contactors and brakes to energize before ramping up the speed. This operates in close loop mode only.
- *Stop 0 Spd Time* keeps the drive running at zero speed until it times out after runs are removed. This value is also in ms. This is used to hold at zero speed until brakes are removed.

5-2.15 Motor Control Mode

Mtr Ctlr Sw toggles between two motor control modes, *Motor Ctrl Mode* and *Motor Ctrl Mode2*.

The motor control mode options are:

- Freq Control – Open loop volts per hertz operation
- OL SpeedCtrl – Open loop speed control
- OL TorqCtrl – Open loop torque control (No encoder)
- CL SpeedCtrl – Close loop control mode
- CL TorqCtrl – Close loop torque control (With encoder)

5-3 LOCAL DRIVE KEYPAD

5-3.1 LOCAL RUN MODE

The drive can be put into the local mode by pressing the local/remote button on the keyboard. This will transfer control as long as the drive is not in PC control or running at the time.

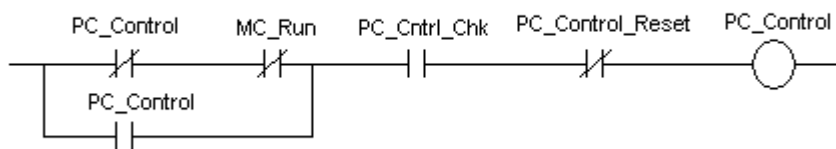
Pressing the Start button on the keypad when in the local mode will initiate a drive Run as long as *MC Ready* is high and the drive is not faulted (*MC Fault* is low)

Pressing the Stop Button on the keypad will initiate a local stop. This does not stop the drive in remote or PC control. See button Stop fault in next section.

5-3.2 BUTTON STOP FAULT

In any mode, if the Stop button is pressed for 4 seconds a button stop fault will occur.

5-4 ADDaptACC SOFTWARE CONTROL

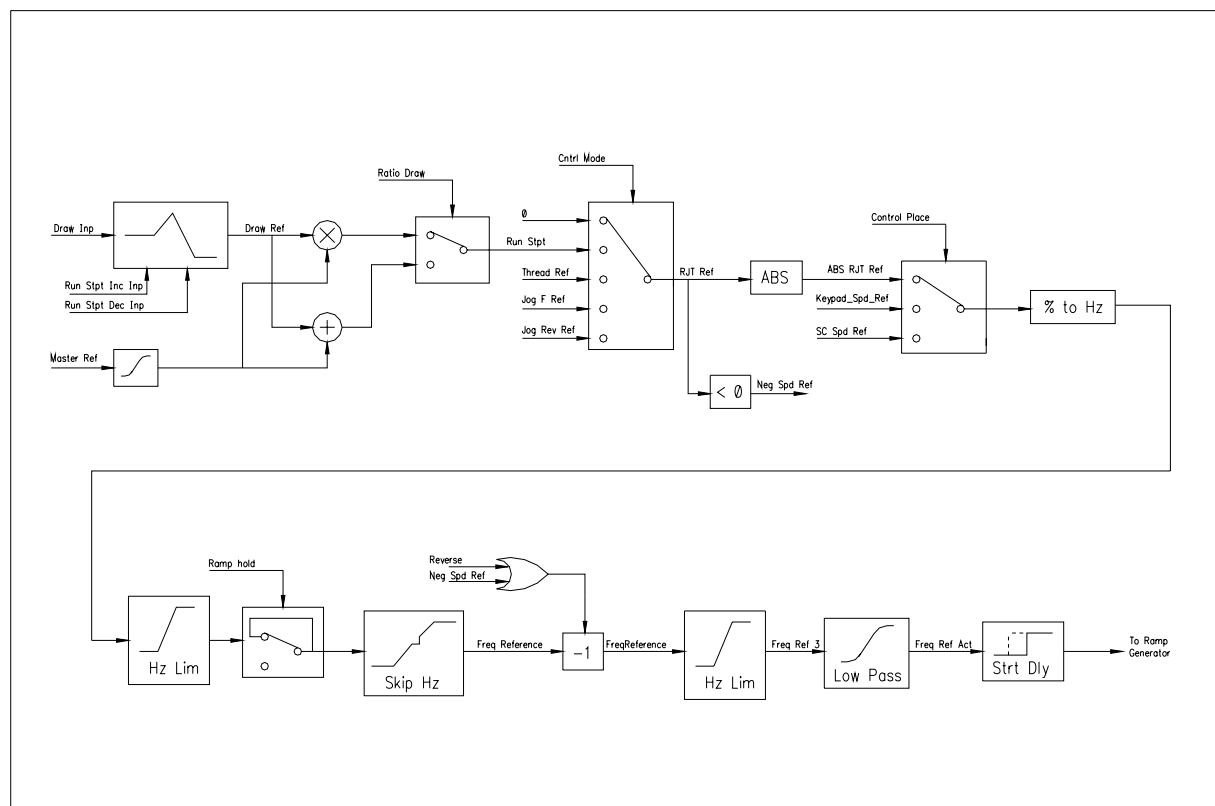


PC Control is enabled by the ADDaptACC diagnostic software package. It will transfer into this mode only if the drive is not running. The drive will transfer out of *PC Control* if communications are lost to the computer.

SECTION VI

REFERENCING AND OUTER CONTROL LOOP

6-1 SPEED RAMP REFERENCE (See Appendix A-1)



6-1.1 RUN REFERENCES

Parameters	Type	Default
<i>Draw Inp</i>	Acfg	<i>Draw Stpt</i> = 1.00
<i>Master Ref</i>	Acfg	<i>Run Speed</i> = 20.00%

Description:

Two inputs are available to set the drives speed while in Run mode. *Master Ref* is the normal speed input and it is defaulted to the calibration value *Run Speed*. *Draw Inp* is the other input and this is defaulted to be a ratio draw input defaulted to a calibration value *Draw Stpt*. Several options are available to manipulate these two inputs including digital increase/decrease, ramping and changing to difference draw as described in the next three sections.

6-1.2 INCREASE / DECREASE COMMANDS

Parameters	Type	Default
<i>Run Stpt Up</i>	E/D	Disabled
<i>Draw Inp</i>	Acfg	<i>Draw Stpt</i> = 1.00
<i>Run Inc Rate</i>	Cal	5.00 Draw/S
<i>Run Dec Rate</i>	Cal	5.00 Draw/S
<i>Run Stpt Res</i>	Bcfg	<i>Cntrl Inhib</i>
<i>Max Run Stpt</i>	Cal	60.00 draw
<i>Min Run Stpt</i>	Cal	- 60.00 draw
<i>Run Stpt Inc Inp</i>	Bcfg	Zero Bit
<i>Run Stpt Dec Inp</i>	Bcfg	Zero Bit
<i>Run Stpt Dif</i>	Apb	
<i>Draw Ref</i>	Apb	
<i>Run In Max</i>	Dpb	
<i>Run In Min</i>	Dpb	

Description:

Draw Ref is the value of *Draw Inp* after modifications by increase or decrease commands. The drive is defaulted so the commands are not active. To activate the commands see the following:

- Set *Run Stpt Inc Inp* to the digital increase command input.
- Set *Run Stpt Dec Inp* to the digital decrease command input.
- Set the rates to ramp the draw by *Run Inc Rate* and *Run Dec Rate*.
- Set *Max Run Stpt* and *Min Run Stpt* as output limits for *Draw Ref*.
- The increase /decrease setting is defaulted to reset on removal of the drive run. Changing *Run Stpt Res* to desired function to reset. Set to *Zero Bit* to disable reset of the draw.
- *Run Stpt Up* is used if a draw is set by both an operator display and increase / decrease commands. If this bit is enabled then the increase / decrease value will be reset upon changes in *Draw Inp*.

6-1.3 RATIO / DIFFERENCE DRAW

Parameters	Type	Default
<i>Draw Ref</i>	Apb	
<i>Slv No Rmp</i>	Bcfg	<i>One Bit</i>
<i>Master Ref</i>	Acfg	<i>Run_Speed</i> = 20.00 %
<i>Slv Rate Lim</i>	Cal	10 % / Sec
<i>Ratio Draw En</i>	E/D	Enabled
<i>Ratio Div</i>	CAL	100
<i>Run Stpt</i>	Apb	

Description:

Master Ref is the speed reference input for most applications. *Slv Rate Lim* is provided to allow for a slower ramp rate other than the internally ramp block. Note that if *Slv No Rmp* is enabled (Set low) and *Slv Rate Lim* is set to zero the output will not update.

If *Ratio Draw En* is disabled *Master Ref* is added to the output of the inc/dec block to become *Run Stpt*.

If *Ratio Draw En* is enabled *Master Ref* is multiplied with the output of the inc/dec block divided by *Ratio Div* to become *Run Stpt*. Default has the output of the inc/dec = 1.00 and Ratio Div as 1.00 so $RunStpt = Master Ref$.

6-1.4 SPEED REFERENCE SELECTION

Parameters	Type	Default
<i>Run Stpt</i>	APB	
<i>Cntrl Mode</i>	APB	
<i>Thread Ref</i>	Acfg	<i>Thread Speed</i> = 10.00 %
<i>Jog F Ref</i>	Acfg	<i>Jog F Speed</i> = 5.00 %
<i>Jog R Ref</i>	Acfg	<i>Jog R Speed</i> = -5.00 %
<i>RJT Ref</i>	APB	
<i>ABS RJT Ref</i>	APB	
<i>Neg Spd Ref</i>	DPB	

Description:

Cntrl Mode from the Run logic determines the value of *RJT Ref* as follows:

- 0 = 0.00%
- 1 = *Run Stpt*
- 2 = *Thread Ref*
- 3 = *Jog F Ref*
- 4 = *Jog R Ref*

The drive is defaulted so the first digital input enables the run and the second digital input enables the jog forward.

ABS_RJT_Ref then becomes the absolute value of *RJT Ref*.
Neg Spd Ref goes high if *RJT Ref* is negative.

6-1.5 REVERSE

Parameters	Type	Default
<i>Reverse Inp</i>	BCFG	<i>Zero Bit</i>
<i>Jog enable</i>	DPB	
<i>Control Place</i>	APB	
<i>Keypad Spd Dir</i>	DPB	
<i>Reverse</i>	DPB	

Description:

Reverse command is dependent on *Control Place* as follows:

- *Control Place* = 0 = Remote Control - Reverse comes from *Reverse Inp* (the reverse input configuration point). This is not used when jogging since there is a separate jog forward and jog reverse. Reverse can also be commanded by having a negative speed reference.
- *Control Place* = 1 = Panel Control – *Keypad Spd Dir* command. This is changed via the keypad.
- *Control Place* = 2 = Computer Control - Reverse comes from a check box on the control pad screen from ADDaptACC

6-1.6 REFERENCE SELECTION AND RAMP HOLD

Parameters	Type	Default
<i>Control Place</i>	APB	
<i>ABS RJT Ref</i>	APB	
<i>LS to Freq</i>	CAL	.600
<i>LS Scl Div</i>	CAL	1000
<i>Min Frequency</i>	CAL	0.00 Hz
<i>Freq Max</i>	CAL	60.00 Hz
<i>Ramp Hold</i>	BCfg	Zero Bit
<i>Freq Ramp Out</i>	APB	

Description:

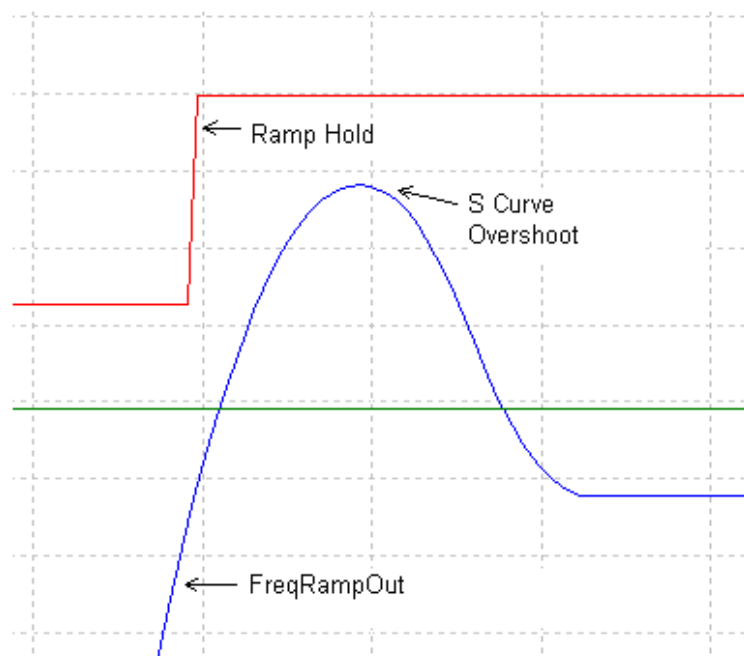
The Speed reference is dependent on *Control Place* as follows:

- *Control Place* = 0 = Remote control - Derived from the Run, Jog, Thread reference *ABS RJT Ref*.
- *Control Place* = 1 = Panel control - Set from the keypad Keypad Spd ref.
- *Control Place* = 2 = Computer control - Set from the computer control slider bar from ADDaptACC.

The Speed reference is then scaled from percent line speed to motor hertz. The default scaling is 100.00% speed = 60.00 Hz. *LS_to_Freq* and *LS_to_Freq* are used for this scaling.

The reference can be held at any time by enabling *Ramp Hold*. This takes the output of the ramped speed reference *Freq Ramp Out* and makes this the reference value. Note: this will hold the reference in all modes except when the run is removed. If you only want this to be active in the run mode, you must use spare logic blocks.

Also note that if S-curve ramping is enabled, the speed will overshoot by the S-curve value, then it will ramp back to the correct value. See the example below:



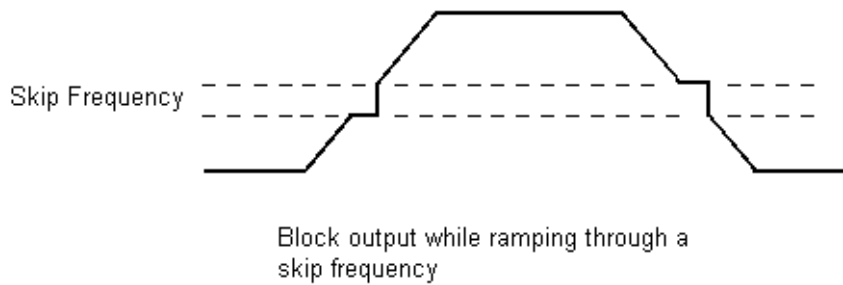
6-1.7 SKIP FREQUENCY AND REFERENCE POLARITY

Parameters	Type	Default
<i>Skip Freq H1</i>	CAL	0
<i>Skip Freq L1</i>	CAL	0
<i>Skip Freq H2</i>	CAL	0
<i>Skip Freq L2</i>	CAL	0
<i>Freq Reference</i>	APB	
<i>Reverse</i>	DPB	
<i>Neg Spd Ref</i>	DPB	
<i>FreqReference</i>	APB	

Description:

The speed reference after the ramp hold logic gets checked for skip frequencies. Two separate skip frequencies can be selected to keep from running the drive within the range. The skip frequencies are entered in motor Hertz.

See the example below:



Freq Reference is the speed reference after the skip frequency logic in motor Hertz.

Freq Reference is then checked for polarity as described in section 6-3 and becomes *FreqReference*. Either *Reverse* or *Neg Spd Ref* will invert the reference.

6-1.8 LOW PASS AND DELAY

Parameters	Type	Default
<i>FreqReference</i>	APB	
<i>Strt 0 Spd Time</i>	CAL	0 ms
<i>RunRequest</i>	DPB	
<i>Freq Ref LP TC</i>	CAL	0 ms

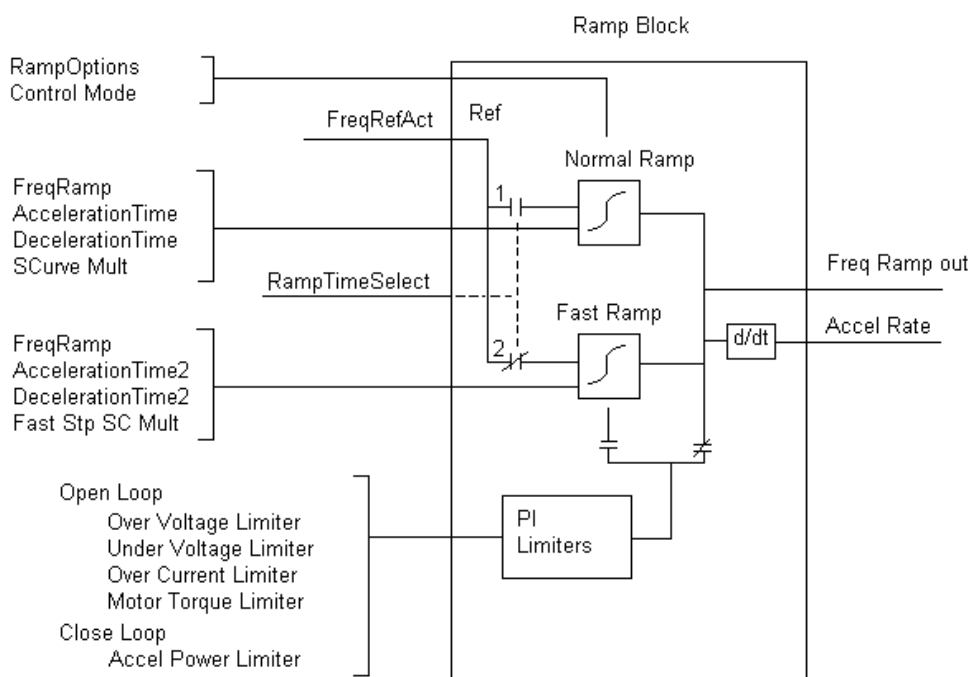
Description:

A second order low pass filter with a time constant of *Freq Ref LP TC* is available to smooth the reference (*FreqReference*), if required.

If the drive is in the closed loop mode of operation, a time delay *Strt 0 Spd Time* can be set to delay the ramping of the reference after *RunRequest*. This can be used to delay for contactor or brake operations.

The output of this section then goes to the ramp generator blocks.

6-1.9 RAMPING



Parameters	Type	Default
<i>Accel Inp</i>	ACFG	<i>Accel Time 1</i> = 10 seconds
<i>Decel Time</i>	ACFG	<i>Decel Time 1</i> = 10 seconds
<i>Skip Freq Mlt</i>	CAL	0.5 ratio
<i>In Skip Freq</i>	DPB	
<i>Acceleration Tim</i>	APB	
<i>Deceleration Time</i>	APB	
<i>Fast Stop Tim</i>	CAL	0.1 seconds
<i>Fast Stop</i>	BCFG	<i>One Bit</i>
<i>Smooth Ratio</i>	CAL	1
<i>Smooth Ratio 2</i>	CAL	0
<i>MC AtSpeed</i>	DPB	
<i>MC Reverse</i>	DPB	

Description:

The ramp rates are entered in seconds, from zero speed to *Freq Max*. A default of ten seconds with *Freq Max* of 60 Hz gives a ramp rate of 6 Hz/s. Forward and reverse acceleration input is *Accel Inp*. Forward and reverse deceleration input is *Decel Time*.

While in any of the three user-defined skip frequencies (*In Skip Freq* is high) , the ramp rate can be modified to get through them quicker. The default multiplier is 0.5. This would reduce the 10 second ramp time to 5 seconds, which increases the ramp rate from 6 Hz/s to 12 Hz/s. The ramp times for the skip frequencies can be viewed at *Acc Skip Tim* and *Dec Skip Tim*.

Acceleration Tim and *Deceleration Time* are the ramp time value depending if the section is in a skip frequency or not.

When *Fast Stop* input is goes low the drive stops at *Fast Stop Tim* ramp time. This allows for a very fast current limit deceleration during emergencies.

Smooth Ratio is used to create a rounding to the ramp rate. The units are in seconds to get to from zero to the ramp rate. Note that if *Smooth Ratio* = 2, then it will take 2 seconds to get to the ramp rate. It does not matter if the rate is 1 Hz/s or 10 Hz/s.

Smooth Ratio 2 is used during the fast stop condition and should be left at zero unless the machine can not handle the stress.

Once the ramping is complete *MC AtSpeed* goes high.

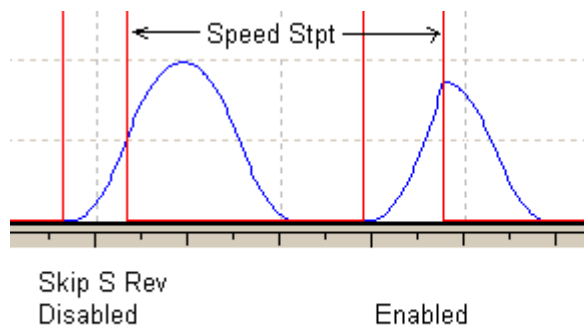
When the drive has ramped through zero and is negative *MC Reverse* goes high.

6-1.10 RAMP OPTIONS

Parameters	Type	Default
<i>Skip S Rev</i>	E/D	Disable
<i>Disable Ramp</i>	BCFG	Zero Bit
<i>Rmp Act Lim</i>	E/D	

Description:

Skip S Rev disables the continuation of an S-Curve when a reference change has been made. For example, if the drive is accelerating and the run is removed, the drive would continue to increase in speed until the S-Curve is complete before starting to decelerate. When *Skip S Rev* is enabled, the drive would not continue to accelerate at the time of the Run off, but start to decelerate right away. See the examples below.



Disable Ramp removes both the linear ramp and S-Curve. This should be used only when the drive is a slave section directly coupled and set as a current follower. This works only in the closed loop mode of operation.

There are four override speed limiters available. These modify the speed reference to keep the drive from faulting out. *Rmp Act Lim* enables these limiters to be ramped instead of being step changes to the speed loop.

6-1.11 RAMP OUTPUTS

Parameters	Type	Default
<i>Freq Ramp Out</i>	APB	
<i>Freq Delta</i>	APB	
<i>Final Freq Ref</i>	APB	

Description:

Freq Ramp Out is the final speed reference after ramping and limiting functions. The value is in Hz. *Freq Delta* is the derivative of the reference. The units are in Hz/s. See the appropriate sections for the other inputs to the blocks.

Freq Ramp Out is checked again to be within the min and max limits and becomes *Final Freq Ref*.

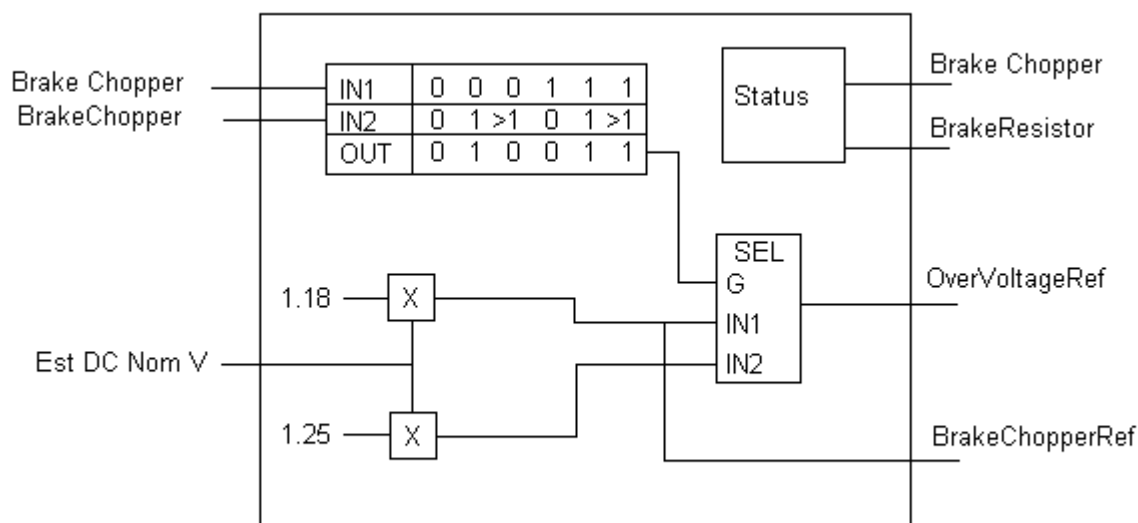
6-2 PI LIMITERS (See Appendix A-1)

There are four open loop PI limiters and two closed loop limiters. When enabled the limiters modify the speed reference to avoid the drive from tripping out. The output of these limiters can go before or after the ramp block depending if *Rmp Act Lim* is enabled.

MtrRegStatus gives the status if a limiter is active as follows:

- 0 = None Active
- Bit 0 = Motoring current
- Bit 1 = Generating current
- Bit 2 = Motoring torque
- Bit 3 = Generating torque
- Bit 4 = Over voltage
- Bit 5 = Under voltage

6-2.1 OPEN LOOP OVERVOLTAGE LIMITER



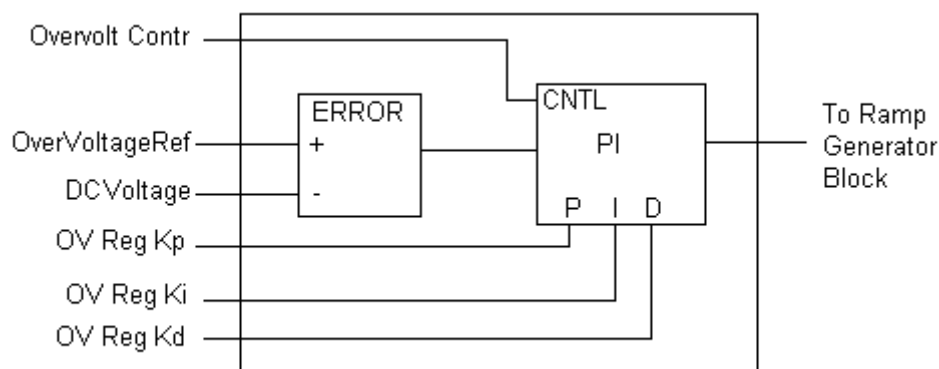
Parameters	Type	Default
<i>Brake Chopper</i>	APB	
<i>BrakeChopper</i>	CAL	0
<i>BrakeResistor</i>	APB	

Description:

The Overvoltage reference is either set to 1.18 or 1.25 times the estimated DC voltage, depending on whether there is a DC chopper and if there is a resistor present.

Brake Chopper is set to 0 if the drive is not equipped with an internal brake Chopper. Otherwise, it is set equal to 1.

BrakeResistor is set to 0 if no resistor is detected when tested. Otherwise, it is set equal to 1.



Parameters	Type	Default
<i>Overvolt Contrl</i>	CAL	0
<i>DCVoltage</i>	APB	

<i>OV Reg Kp</i>	CAL	By frame size
<i>OV Reg Kd</i>	CAL	By frame size
<i>OV Reg Ki</i>	CAL	By frame size
<i>Field WeakngPnt</i>	CAL	60 Hz

Description:

The Overvoltage limiter can be used to avoid the DC Bus from tripping out. This modifies the speed reference to try and keep the Bus voltage down.

Overvolt Contrl can be set to disabled, no ramp (resets the integrator), or ramping. Default is disabled.

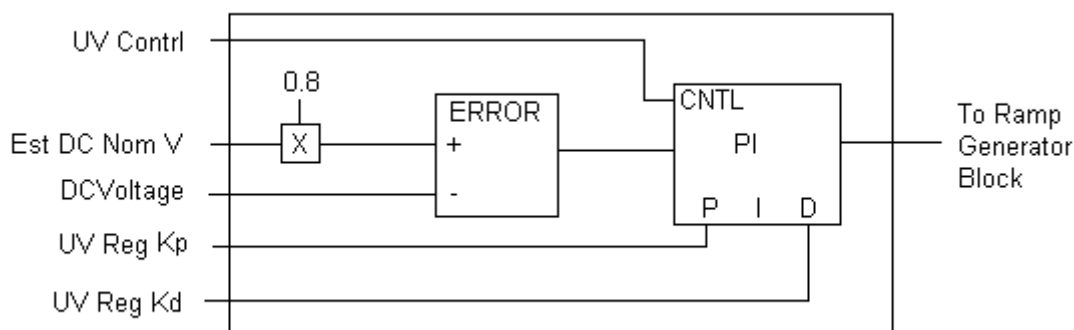
The over voltage reference is either 1.18 or 1.25 times the nominal bus voltage, depending on if there is a brake chopper circuit and resistor present.

The four gains *OV Reg Kp*, *OV Ref Kp Add*, *OV Reg Ki*, and *OV Reg Kd* all have different default values based on frame size. These should not need to be tuned except for extreme situations.

OV Ref Kp Add is an additional P gain for low speeds. It will decay to zero when the drive gets to the *Field WeakngPnt* (default 60 Hz). This feature is not changeable in our standard Stop Tape software.

The output of the regulator, when enabled, will add or subtract to the speed reference in the Ramp Generator block and become part of *Freq Ramp Out*.

6-2.2 OPEN LOOP UNDERVOLTAGE LIMITER



Parameters	Type	Default
<i>UV Contrl</i>	CAL	disable
<i>DCVoltage</i>	APB	
<i>UV Reg Kp</i>	CAL	By frame size
<i>UV Reg Kd</i>	CAL	By frame size
<i>Field WeakngPnt</i>	CAL	60 Hz

Description:

The Undervoltage limiter can be used to avoid the DC Bus from tripping out. This modifies the speed reference to try and keep the Bus voltage up.

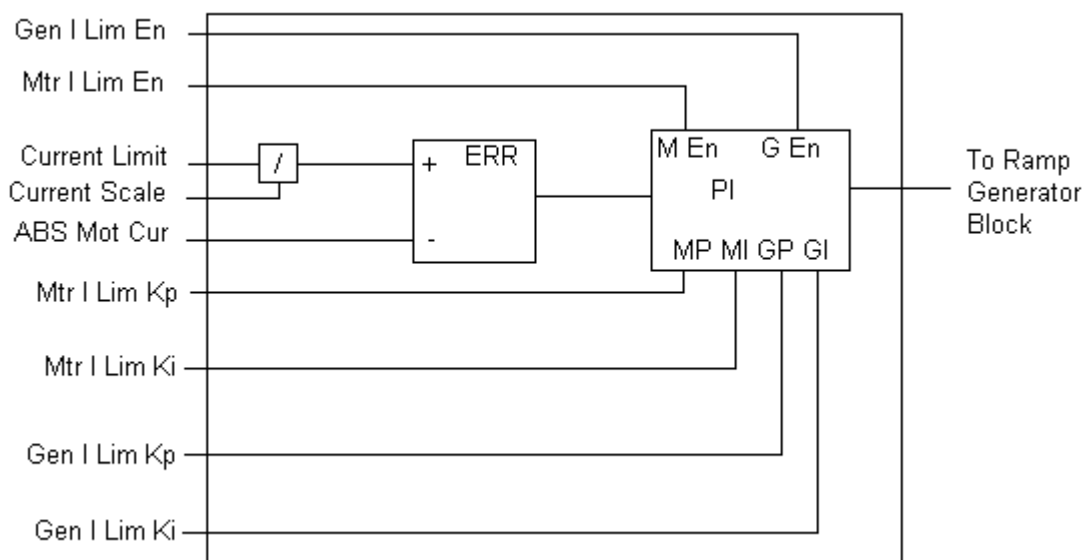
UV Contrl can be used to enable or disable this function. It is defaulted to disable.

The setpoint is $0.8 \times \text{DC voltage}$.

The *UV Reg Kp* and *UV Reg Kd* have different default values based on frame size. These should not need to be tuned except for extreme situations.

The output of the regulator, when enabled, will add or subtract to the speed reference in the Ramp Generator block and become part of *FreqRampOut*.

6-2.3 OPEN LOOP CURRENT LIMITER



Parameters	Type	Default
<i>Gen I Lim En</i>	EN	1 – Disable
<i>Mtr I Lim En</i>	EN	1 – Disable
<i>Mtr I Lim Kp</i>	CAL	By frame size
<i>Mtr I Lim Ki</i>	CAL	By frame size
<i>Gen I Lim Kp</i>	CAL	By frame size
<i>Gen I Lim Ki</i>	CAL	By frame size

Description:

The overcurrent limiter can be used to avoid the drive from tripping out. This modifies the speed reference to try and keep the current within tolerance.

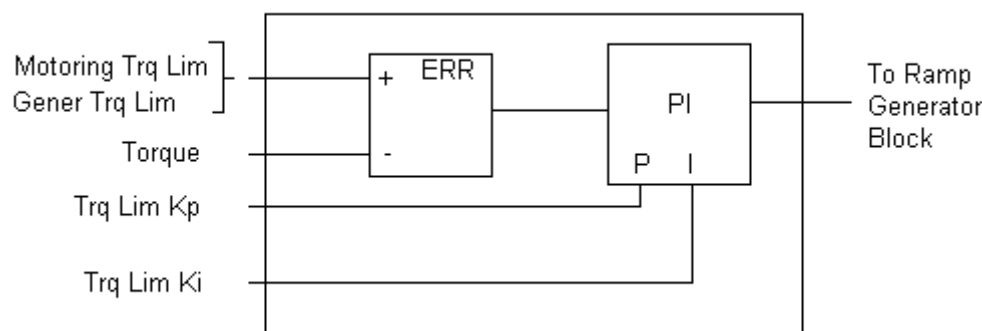
There are two regulators based on whether the drive is motoring or regenerating. *Gen I Lim En* enables the regeneration regulator, while *Mtr I Lim En* enables the motoring regulator. Both are defaulted to disable.

The entered current limit is the setpoint. This gets subtracted to the absolute value of the motor current to create the regulator error.

The four gains *Mtr I Lim Kp*, *Mtr I Lim Ki*, *Gen I Lim Kp* and *Gen I Lim Ki* have different default values based on frame size. These should not need to be tuned except for extreme situations.

The output of the regulator, when enabled, will add or subtract to the speed reference in the Ramp Generator block and become part of *FreqRampOut*.

6-2.4 OPEN LOOP TORQUE LIMITER



Parameters	Type	Default
<i>Motoring Trq Lim</i>	CAL	300%
<i>Gener Trq Lim</i>	CAL	300%
<i>Motor Torque</i>	APB	
<i>Trq Lim Kp</i>	CAL	3000
<i>Trq Lim Ki</i>	CAL	200

Description:

The over torque limiter can be used to avoid the drive from tripping out. This modifies the speed reference to try and keep the current within tolerance.

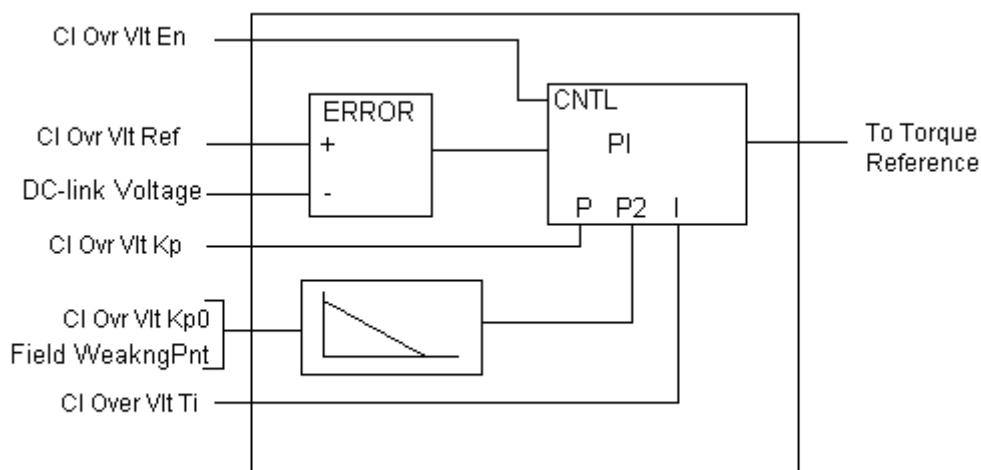
There are two regulators based on whether the drive is motoring or regenerating. Unlike the other regulators, there is no enable or disable for this limiter. The limits can be set above 300% to cause the drive to trip prior to the regulator turning on.

Motoring Trq Lim and *Gener Trq Lim* are the torque limits to start regulating the speed reference down. These are in percent motor torque. The feedback is unfiltered, calculated motor torque.

$Trq\ Lim\ Kp$ and $Trq\ Lim\ Ki$ are set up to run stable. These should not need to be tuned except for extreme situations.

The output of the regulator, when enabled, will add or subtract to the speed reference in the Ramp Generator block and become part of $FreqRampOut$.

6-2.5 CLOSED LOOP OVER VOLTAGE LIMITER (See Appendix A-10)



Parameters	Type	Default
$Cl\ Ovr\ Vlt\ En$	EN	Disable
$Cl\ Ovr\ Vlt\ Ref$	CAL	118%
$Cl\ Ovr\ Mtr\ Lim$	CAL	100%
$Cl\ Ovr\ Vlt\ Kp$	CAL	50
$Cl\ Ovr\ Vlt\ Ti$	CAL	15

Description:

Unlike the other limiters the close loop over voltage limiter modifies the torque producing current to the motor.

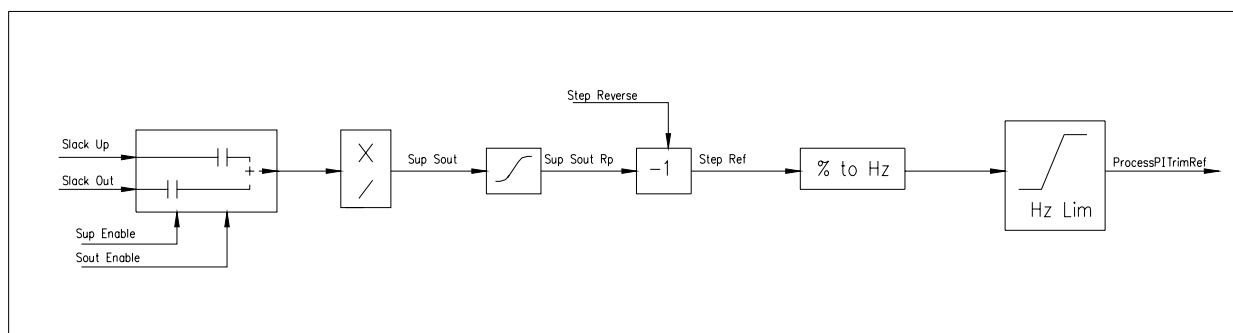
The controller is a PI regulator that will try and keep the DC-voltage below $Cl\ Ovr\ Vlt\ Ref$ percent of nominal bus voltage.

$Cl\ Ovr\ Vlt\ Kp$ and $Cl\ Ovr\ Vlt\ Ti$ are setup to run stable. These should not need to be tuned except for extreme situations.

$Cl\ Ovr\ Vlt\ Kp0$ is an additional gain added from field weakening frequency to zero frequency. This feature is changeable in our standard Stop Tape software.

6-3 SPEED STEP REFERENCE (See Appendix A-2)

FreqRampOut is the final ramped speed reference after the limiters. Droop and step inputs are then added to this value before going to the velocity controller. Depending if the section is configured for open or closed loop, this section varies slightly.



6-3.1 SPEED STEP REFERENCES

Parameters	Type	Default
<i>Sup Enable</i>	BCFG	Zero Bit
<i>Sout Enable</i>	BCFG	Zero Bit
<i>Slack Up</i>	ACFG	<i>Spd Slk Up</i> = 10.00 %
<i>Slack Out</i>	ACFG	<i>Spd Slk Out</i> = -10.00%
<i>Slack Mult</i>	ACFG	<i>Int Hundred</i> = 1.00
<i>Slack Div</i>	CAL	100
<i>Sup Sout</i>	APB	
<i>Slk No Ramp</i>	BCFG	One Bit
<i>Slack Rate</i>	CAL	10.0 % / second
<i>Sup Sout Rp</i>	APB	

Description:

Slack Up and *Slack Out* inputs are available to inject step changes into the speed reference. If both are enabled the values are added. These can be used for tuning or current sharing. The outer tension loop can also be configured to one of these inputs for speed trim control.

Slack Mult and *Slack Div* are available to scale or multiply the slack reference. This can be used to provide a percentage step. $Sup\ Sout = \text{the enabled input} \times Slack\ Mult / Slack\ Div$. *Slack Div* is used to keep the decimal points correct.

A rate-of-change limit can then be applied to *Sup Sout* to become *Sup Sout Rp*. This can be used if a pure step is too harsh for the system. *Slack Rate* is the rate and is entered in percent change per second. The ramp limit is defaulted to be bypassed (*Slk No Ramp* = One Bit).

6-3.2 SPEED STEP SCALING, REVERSE AND LIMITS

Parameters	Type	Default
<i>Sup Sout Rp</i>	APB	
<i>Step Reverse</i>	BCFG	Zero Bit
<i>Step Ref</i>		APB
<i>LS_to_Freq</i>	CAL	60
<i>LS_Scl_Div</i>	CAL	100
<i>Speed Step</i>	CAL	0
<i>Freq Max</i>	CAL	60 Hz
<i>Freq Ramp Out</i>	APB	
<i>ProcessPITrimRef</i>	APB	

Description:

Step Reverse enables the inverse polarity of *Sup Sout Rp*. The signal then becomes *Step Ref*.

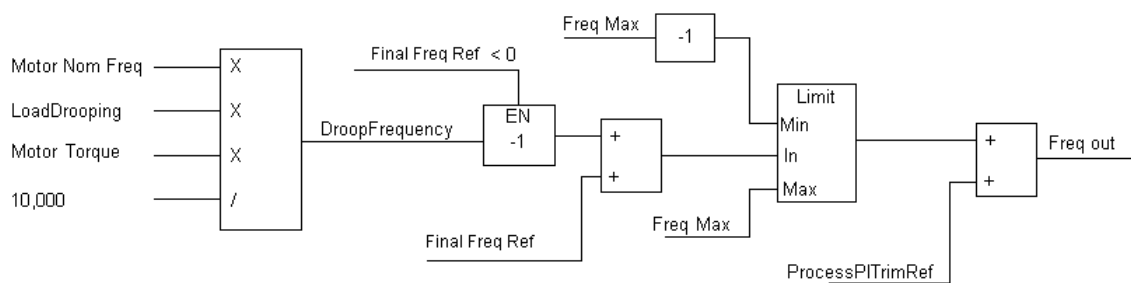
LS to Freq and *LS Scl Div* are used to scale the speed step from process units to motor hertz.

Caution: The same scaling factors are used to re-scale the speed ramp reference.

Speed Step is used by ADDaptACC to assist in tuning the speed loop. Can be toggled and set via the program.

Since this reference gets added to the ramped speed reference and goes directly to the speed loop error, limit checking must be done. The limits are set to *FreqMax* plus or minus the output of *Freq Ramp Out*.

6-3.3 OPEN LOOP STEP REFERENCE (See Appendix A-9)



Parameters	Type	Default
<i>Motor Nom Freq</i>	CAL	60.00 Hz
<i>LoadDrooping</i>	CAL	0
<i>Motor Torque</i>	APB	
<i>DroopFrequency</i>	APB	
<i>Final Freq Ref</i>	APB	
<i>Freq out</i>	APB	
<i>Freq Max</i>	CAL	60.00 Hz

Description:

Final Freq Ref is modified by the droop control. Droop gain is set from the *LoadDrooping* parameter. A setpoint of 100 equals 100% speed droop at 100% torque.

Example:

LoadDroop = 5.00%

Motor Nom Freq = 60.00 Hz

Motor Torque = 25.0%

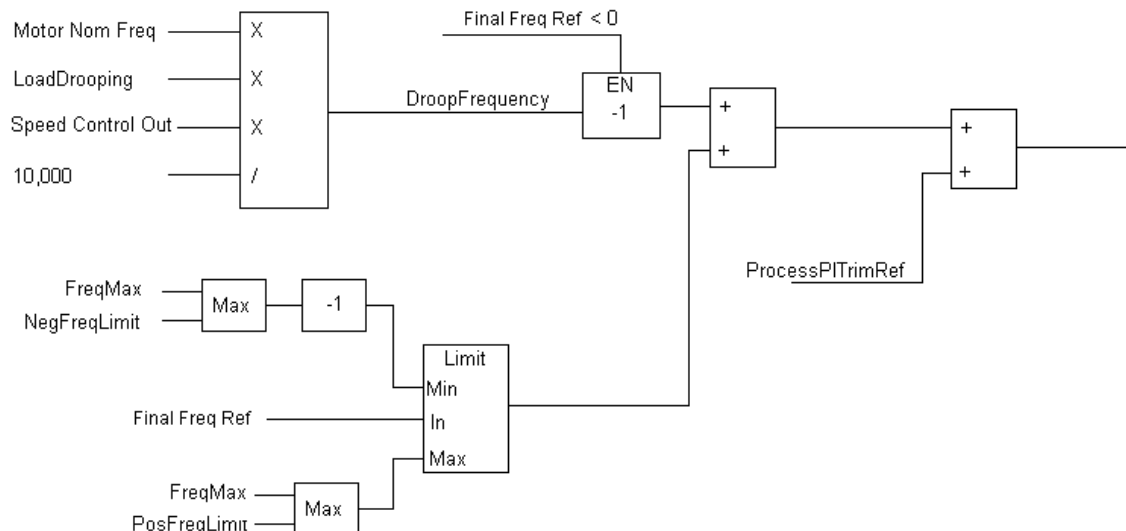
DroopFrequency would be equal to 0.75 Hz.

DroopFrequency is positive if the section is in motoring quadrant, so the value subtracted from the speed if running forward and added if running reverse.

The speed reference is then checked to be within +/- *FreqMax* limit and added to the *ProcessPITrimRef* from the slack step inputs. The final value that goes to the open loop regulator is called *Freq out*.

6-3.4 CLOSED LOOP STEP REFERENCE

(See Appendix A-10)



Parameters	Type	Default
<i>Motor Nom Freq</i>	CAL	60.00 Hz
<i>Motor Torque</i>	APB	
<i>LoadDrooping</i>	CAL	0
<i>Speed Cntrl Out</i>	APB	
<i>DroopFrequency</i>	APB	
<i>Freq Max</i>	CAL	60.00 Hz
<i>ProcessPITrimRef</i>	APB	

Parameters	Type	Default
<i>Pos Freq Limit</i>	CAL	60.00 Hz
<i>Neg Freq Limit</i>	CAL	-60.00 Hz
<i>Final Freq Ref</i>	APB	

Description:

Final Freq Ref is checked to make sure it is within the minimum and maximum limits

This is then modified by the droop control. Droop gain is set from the *LoadDrooping* parameter. A setpoint of 100 equals 100% speed droop at 100% torque.

Example:

LoadDroop = 5.00%

Motor Nom Freq = 60.00 Hz

Motor Torque = 25.0%

DroopFrequency would be equal to 0.75 Hz.

DroopFrequency is positive if the section is in the motoring quadrant, so the value is subtracted from the speed if running forward and added if running reverse.

DroopFrequency is then added to the *ProcessPITrimRef* from the slack step inputs. The final value that goes to the close loop regulator.

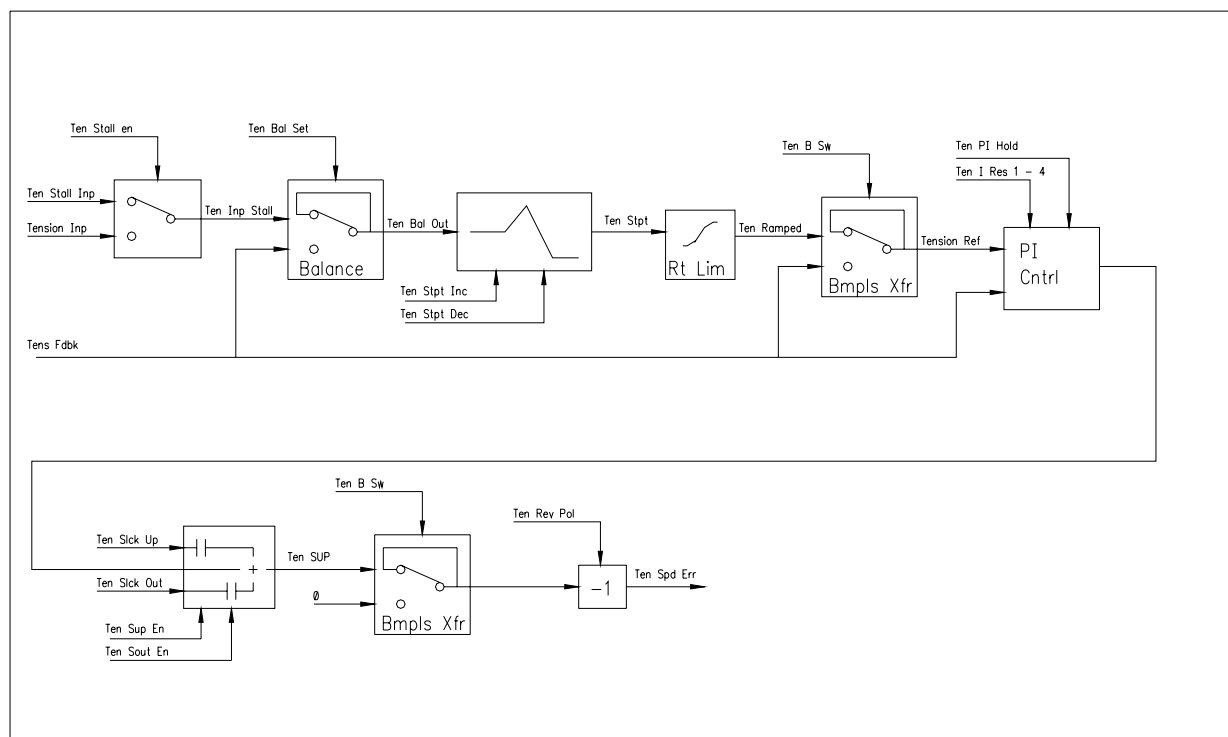
6-4 TENSION LOOP (See Appendix A-3)

The tension loop is fully configurable to be used as tension, pressure, temperature, dancer, or any other process control.

The output of the tension loop can control the drive as a speed trim, speed reference, or torque reference.

The output can also be configured to an analog output or to the communications words to control an external function not related to the drive, such as an unwind brake or pressure controller.

The tension loop is broken down into tension reference blocks and tension loop blocks.



6-4.1 TENSION REFERENCE – SETPOINTS

Parameters	Type	Default
Ten Stall En	BCFG	Zero Bit
Ten Stall Inp	ACFG	Ten Stall = 10.00%
Tension Inp	ACFG	Ten Ref = 50.00%
Ten Inp Stall	APB	
Ten Bal Ret	BCFG	Zero Bit
Ten Bal Dif	APB	
Ten Bal Set	BCFG	One Bit
Tens Fdbk	ACFG	Zero Analog
Ten Bal out	APB	
Ten Stpt Up	E	Disable
Ten Dec Rate	CAL	5.00 %/s
Ten Inc Rate	CAL	5.00 %/s
Ten Stpt Res	BCFG	Zero Bit
Ten Stpt Max	CAL	100.00 %
Ten Stpt Min	CAL	0.00%
Ten Stpt Inc	BCFG	Zero Bit
Ten Stpt Dec	BCFG	Zero Bit
Ten Stpt Dif	APB	
Ten Stpt	APB	
Ten Stpt Max	DPB	
Ten Stpt Min	DPB	

Description:

The tension reference can come from any combination of inputs.

- Selection between *Ten Stall Inp* or *Tension Inp*. Both of these can be left at their default calibration value or configured to get its reference from an external source.
- The balance block can be used to sample *Tens Fdbk* and use that value as the reference. It can then be modified by changing *Tension Inp*. This is used when the operator gets the machine to where he likes the running conditions then switches it over to tension control to hold it there.
- The setpoint block is used either to set the tension reference from increase/decrease push buttons or modify the input reference. The block has settable rates and limits along with auto reset on input updates.

6-4.2 TENSION REFERENCE – RAMP AND TRANSFER

Parameters	Type	Default
<i>Ten Stpt</i>		APB
<i>Ten Rmp Res</i>	BCFG	Zero Bit
<i>Ten Ramp Rate</i>	CAL	5 s
<i>Ten Ramped</i>	APB	
<i>Ten B Sw</i>	BCFG	One Bit
<i>Ten B Rate</i>	CAL	5.00 s
<i>Tens Fdbk</i>	ACFG	Zero Analog
<i>Tension Ref</i>	APB	

Description:

The tension reference (*Ten Stpt*) goes through a linear ramp with an adjustable rate called *Ten Ramp Rate*. From here the value is enabled via the bumpless switch. This ramps the reference from the feedback value to its running value when tension is enabled. This provides a smooth transition into tension mode. The rate of the transfer is set by *Ten B Rate*. Once the transition is complete, the block passes its input to the output. *Tension Ref* then goes to the tension PI block.

6-4.3 TENSION LOOP

Parameters	Type	Default
<i>Ten I Res 1</i>	BCFG	<i>Cntrl Inhib</i>
<i>Ten I Res 2</i>	BCFG	<i>One Bit</i>
<i>Ten I Res 3</i>	BCFG	<i>Ten At Max</i>
<i>Ten I Res 4</i>	BCFG	<i>Ten At Min</i>
<i>Ten PI Hold</i>	BCFG	<i>Zero Bit</i>
<i>Ten Preload</i>	ACFG	<i>Zero Analog</i>
<i>Ten P Inp</i>	ACFG	<i>Ten P Gain = .01</i>
<i>Ten I Inp</i>	ACFG	<i>Ten I Gain = 1.00</i>
<i>Ten PI Out</i>	APB	
<i>Ten Max Lmt</i>	CAL	10.00 %
<i>Ten Min Lmt</i>	CAL	-10.00%
<i>Ten PI Gn Scale</i>	CAL	1
<i>Tension Ref</i>	APB	
<i>Tens Fdbk</i>	ACFG	<i>Zero Analog</i>
<i>Ten PI Min</i>	DPB	
<i>Ten PI Max</i>	DPB	

Description:

The PI regulator can be reset from one of four selectable bits. The defaults are:

- *Cntrl Inhib*, which goes high after the drive is stopped.
- *Ten At Max*, *Ten At Min*, which disable the PI block and enable the slack steps. Helpful for dancer control.
- *One Bit*, which disables the loop unless needed.

When reset, the output can be set to a preload value by setting *Ten Preload* to the desired input.

When *Ten PI Hold* goes high, the tension regulator is held at its last output. The reset inputs have a higher priority than the hold input.

The proportional gain value of 1.0 will produce an output of 1 with an error of 1. The integral gain is in repeats per gain. With an I gain value of 5.00 and an error of 10, the output will ramp by 10 every five seconds.

Ten PI Gn Scale is a direct multiply on the error. This has the net affect of increasing both the P and the I gains.

The output of the regulator is limited by *Ten Max Lmt* and *Ten Min Lmt*. If the output is a speed reference trim, then these limits affect the amount the speed can change.

6-4.4 TENSION LOOP – OUTPUT

Parameters	Type	Default
<i>Ten Sup En</i>	BCFG	<i>Ten At Min</i>
<i>Ten Sout En</i>	BCFG	<i>Ten At Max</i>
<i>Ten PI Out</i>	APB	
<i>Ten Slck Up</i>	ACFG	<i>Ten Slk Up</i> = 10.00%
<i>Ten Slck Out</i>	ACFG	<i>Ten Slk Out</i> = -10.00%
<i>Ten SUP</i>	APB	
<i>Spd Bump Sw</i>	BCFG	<i>Zero Bit</i>
<i>Spd B Rate2</i>	CAL	5.00 %/s
<i>Ten Rev Pol</i>	BCFG	<i>Zero Bit</i>
<i>Ten Spd Err</i>	APB	

Description:

The output of the Tension regulator passes through the following enable blocks before it is used in the control. The summing block allows additional references to be added after the regulator. It is defaulted to add or subtract 10% reference if the tension feedback is out of range. To disable this feature, set the associated configuration bits to *Zero Bit* (1002).

The bumpless switch is used to smoothly transfer out of tension control back to speed control. It will ramp its output to zero by the *Spd B Rate2* value in % per second.

Ten Rev Pol corrects *Ten Spd Err* for the proper polarity to the control reference.

Ten Spd Err can be configured to become a speed reference trim or torque reference, or configured to an analog output for external control.

6-4.5 TENSION LOOP – FEEDBACK COMPARATOR

Parameters	Type	Default
<i>Ten Cmp Stp</i>	ACFG	<i>Max Tension</i> = 100.00%
<i>Max Ten Set</i>	CAL	90.00%
<i>Min Ten Set</i>	CAL	10.00%
<i>Max Ten Hys</i>	CAL	5.00%
<i>Tens Fdbk</i>	ACFG	<i>Zero Analog</i>
<i>Ten HL Decimal</i>	CAL	2
<i>Ten At Max</i>	DPB	
<i>Ten_At_Min</i>	DPB	

Description:

The tension feedback comparator can be used to shut down the line on overtension or perform a web loss detection. It can also be used on dancer control to take the section out of tension control and add a speed slack up until the dancer is lifted. The compare block setting is a percentage of *Ten Cmp Stp*.

Ten At Max will go high when *Tens Fdbk* goes above the *Max Ten Set* percentage of *Ten Cmp Stp*.

Ten At Min will go high when *Tens Fdbk* goes below the *Min Ten Set* percentage of *Ten Cmp Stp*.

6-5 SPARE BLOCKS (See Appendix A-6)

Spare blocks are logic blocks that can be used and inserted anywhere in the software. The following lists the blocks available.

6-5.1 SPARE REFERENCE BLOCKS

Parameters	Type	Default
Table Block		
<i>Sp_Tbl0 Inp</i>	ACFG	<i>One Analog</i>
<i>Sp_Tbl0 Xin</i>	ACFG	<i>Zero Analog</i>
<i>Sp_Tbl0 Gn</i>	CAL	1.00
<i>Table 0</i>	Array	Table 0 32 values
<i>Sp Tbl0 Out</i>	APB	
Table Block		
<i>Sp_Tbl1 Inp</i>	ACFG	<i>One Analog</i>
<i>Sp_Tbl1 Xin</i>	ACFG	<i>Zero Analog</i>
<i>Sp_Tbl1 Gn</i>	CAL	1.00
<i>Table 1</i>	Array	Table 1 32 values
<i>Sp Tbl1 Out</i>	APB	
Table Block		
<i>Sp_Tbl2 Inp</i>	ACFG	<i>One Analog</i>
<i>Sp_Tbl2 Xin</i>	ACFG	<i>Zero Analog</i>
<i>Sp_Tbl2 Gn</i>	CAL	1.00
<i>Table 2</i>	Array	Table 2 32 values
<i>Sp Tbl2_Out</i>	ACFG	<i>Zero Analog</i>
Muldiv Block		
<i>Sp MD1 Val</i>	ACFG	<i>Zero Analog</i>
<i>Sp MD1 Mul</i>	ACFG	<i>Sp MD1 Mlt = 1.00</i>
<i>Sp MD1 Div</i>	ACFG	<i>Sp MD1 Dv = 1.00</i>
<i>Sp MD1 Out</i>	APB	
Muldiv Block		
<i>Sp MD2 Val</i>	ACFG	<i>Zero Analog</i>
<i>Sp MD2 Mul</i>	ACFG	<i>Sp MD2 Mlt = 1.00</i>
<i>Sp MD2 Div</i>	ACFG	<i>Sp MD2 Dv = 1.00</i>
<i>Sp MD2 Out</i>	APB	
Add Block		
<i>Sp Add1 In1</i>	ACFG	<i>Sp Add Val = 0.00</i>
<i>Sp Add1 In2</i>	ACFG	<i>Sp Add Val = 0.00</i>
<i>Sp Add1 Out</i>	APB	
Sub Block		
<i>Sp Sub1 In1</i>	ACFG	<i>Sp Sub Val = 0.00</i>
<i>Sp Sub1 In2</i>	ACFG	<i>Sp Sub Val = 0.00</i>
<i>Sp Sub1 Out</i>	APB	

Low Pass Block

<i>Sp LP Fil TC</i>	CAL	0.1 sec
<i>Sp LP Fil In</i>	ACFG	<i>Zero Analog</i>
<i>Sp LP Fil Out</i>	APB	

ABS Block

<i>Sp ABS In</i>	ACFG	<i>Zero Analog</i>
<i>Sp ABS Out</i>	APB	

Sum Block

<i>Sp Sum1 EnA</i>	BCFG	<i>Zero_Bit</i>
<i>Sp Sum1 EnB</i>	BCFG	<i>Zero_Bit</i>
<i>Sp Sum1 EnB</i>	BCFG	<i>Zero_Bit</i>
<i>Sp Sum1 InA</i>	ACFG	<i>Sp Sum1 StA = 0.00</i>
<i>Sp Sum1 InB</i>	ACFG	<i>Sp Sum1 StB = 0.00</i>
<i>Sp Sum1 InC</i>	ACFG	<i>Sp Sum1 StC = 0.00</i>
<i>Sp Sum1 Out</i>	APB	

Bumpless Block

<i>Sp Bmp Sw</i>	BCFG	<i>Zero_Bit</i>
<i>Sp Bmp In1</i>	ACFG	<i>Sp Bmp St1 = 0</i>
<i>Sp Bmp Rate1</i>	CAL	0
<i>Sp Bmp In2</i>	ACFG	<i>Sp Bmp St2 = 0</i>
<i>Sp Bmp Rate2</i>	CAL	0
<i>Sp Bmp Hold</i>	BCFG	<i>Zero Bit</i>
<i>Sp Bmp Dn1</i>	DPB	
<i>Sp Bmp Dn2</i>	DPB	
<i>Sp Bmp Out</i>	APB	

Sel Block

<i>Sp Sel1 En1</i>	BCFG	<i>Zero_Bit</i>
<i>Sp Sel1 In0</i>	ACFG	<i>Sp Sel1 ST0 = 0</i>
<i>Sp Sel1 In1</i>	ACFG	<i>Sp Sel1 ST1 = 0</i>
<i>Sp Sel1 Out</i>	APB	

Sel Block

<i>Sp Sel2 En1</i>	BCFG	<i>Zero_Bit</i>
<i>Sp Sel2 In0</i>	ACFG	<i>Sp Sel2 ST0 = 0</i>
<i>Sp Sel2 In1</i>	ACFG	<i>Sp Sel2 ST1 = 0</i>
<i>Sp Sel2 Out</i>	APB	

Lim Block

<i>Sp Lim Min</i>	CAL	-100.00
<i>Sp Lim Max</i>	CAL	100.00
<i>Sp Lim Inp</i>	ACFG	<i>Zero_Analog</i>
<i>Sp Lim Out</i>	APB	

WParamVal

<i>Sp WPVal Inp</i>	ACFG	<i>Zero_Analog</i>
<i>Sp WPVal ID</i>	ACFG	0

WParamVal

<i>Sp WPVal2 Inp</i>	ACFG	<i>Zero_Analog</i>
<i>Sp WPVal2 ID</i>	ACFG	0

Description:

Each of these blocks is an individual block as described in the block functional specification.

6-5.2 SPARE LOGIC BLOCKS

Parameters	Type	Default
HL Comp Block		
<i>Sp HL Stpt</i>	ACFG	<i>Sp HL Stpt</i> = 100.00
<i>Sp HL High</i>	CAL	90.00
<i>Sp HL Low</i>	CAL	10.00
<i>Sp HL Hyst</i>	CAL	<i>Sp HL Hyst</i> = 1.00
<i>Sp HL Inp</i>	ACFG	<i>Zero Analog</i>
<i>Sp LH Decimal</i>	CAL	2
<i>Sp HL Max</i>	DPB	
<i>Sp HL Min</i>	DPB	
Comp Block		
<i>Sp Cmp1 In</i>	ACFG	<i>Sp Cmp1 Stpt</i> = 50.00
<i>Sp Cmp1 Thres</i>	ACFG	<i>Sp Cmp1 Stpt</i> = 50.00
<i>Sp Cmp1 Hyst</i>	CAL	1.00
<i>Sp Cmp1 Out</i>	DPB	
<i>Sp Cmp1 Eq</i>	DPB	
Comp Block		
<i>Sp Cmp2 In</i>	ACFG	<i>Sp Cmp2 Stpt</i> = 50.00
<i>Sp Cmp2 Thres</i>	ACFG	<i>Sp Cmp2 Stpt</i> = 50.00
<i>Sp Cmp2 Hyst</i>	CAL	1.00
<i>Sp Cmp2 Out</i>	DPB	
<i>Sp Cmp2 Eq</i>	DPB	
Delay Block		
<i>Sp Dly1 TON</i>	CAL	0.100 seconds
<i>Sp Dly1 TOFF</i>	CAL	0.100 seconds
<i>Sp Dly1 In</i>	BCFG	<i>Zero Bit</i>
<i>Sp Dly1 Out</i>	DPB	
Delay Block		
<i>Sp Dly2 TON</i>	CAL	0.100 seconds
<i>Sp Dly2 TOFF</i>	CAL	0.100 seconds
<i>Sp Dly2 In</i>	BCFG	<i>Zero Bit</i>
<i>Sp Dly2 Out</i>	DPB	
Latch Block		
<i>Sp Ltch1 L</i>	BCFG	<i>Zero Bit</i>
<i>Sp Ltch1 H1</i>	BCFG	<i>One Bit</i>
<i>Sp Ltch1 H2</i>	BCFG	<i>One Bit</i>
<i>Sp Ltch1 Out</i>	DPB	
Latch Block		
<i>Sp Ltch2 L</i>	BCFG	<i>Zero Bit</i>
<i>Sp Ltch2 H1</i>	BCFG	<i>One Bit</i>
<i>Sp Ltch2 H2</i>	BCFG	<i>One Bit</i>
<i>Sp Ltch2 Out</i>	DPB	
Latch Block		
<i>Sp Ltch3 L</i>	BCFG	<i>Zero Bit</i>
<i>Sp Ltch3 H1</i>	BCFG	<i>One Bit</i>
<i>Sp Ltch3 H2</i>	BCFG	<i>One Bit</i>
<i>Sp Ltch3 Out</i>	DPB	

Parameters	Type	Default
BInv Block		
<i>Sp Inv1 In</i>	BCFG	<i>Zero Bit</i>
<i>Sp Inv1 Out</i>	DPB	
BInv Block		
<i>Sp Inv2 In</i>	BCFG	<i>Zero Bit</i>
<i>Sp Inv2 Out</i>	DPB	
BInv Block		
<i>Sp Inv3 In</i>	BCFG	<i>Zero Bit</i>
<i>Sp Inv3 Out</i>	DPB	
Or Block		
<i>Sp Or1 In1</i>	BCFG	<i>Zero Bit</i>
<i>Sp Or1 In2</i>	BCFG	<i>Zero Bit</i>
<i>Sp Or1 Nin3</i>	BCFG	<i>One Bit</i>
<i>Sp Or1 Out</i>	DPB	
Or Block		
<i>Sp Or2 In1</i>	BCFG	<i>Zero Bit</i>
<i>Sp Or2 In2</i>	BCFG	<i>Zero Bit</i>
<i>Sp Or2 Nin3</i>	BCFG	<i>One Bit</i>
<i>Sp Or2 Out</i>	DPB	
Or Block		
<i>Sp Or3 In1</i>	BCFG	<i>Zero Bit</i>
<i>Sp Or3 In2</i>	BCFG	<i>Zero Bit</i>
<i>Sp Or3 Nin3</i>	BCFG	<i>One Bit</i>
<i>Sp Or3 Out</i>	DPB	
And Block		
<i>Sp And1 In1</i>	BCFG	<i>One Bit</i>
<i>Sp And1 In2</i>	BCFG	<i>One Bit</i>
<i>Sp And1 Nin3</i>	BCFG	<i>Zero Bit</i>
<i>Sp And1 Out</i>	DPB	
And Block		
<i>Sp And2 In1</i>	BCFG	<i>One Bit</i>
<i>Sp And2 In2</i>	BCFG	<i>One Bit</i>
<i>Sp And2 Nin3</i>	BCFG	<i>Zero Bit</i>
<i>Sp And2 Out</i>	DPB	
And Block		
<i>Sp And3 In1</i>	BCFG	<i>One Bit</i>
<i>Sp And3 In2</i>	BCFG	<i>One Bit</i>
<i>Sp And3 Nin3</i>	BCFG	<i>Zero Bit</i>
<i>Sp And3 Out</i>	DPB	

SECTION VII

MOTOR CONTROL MODE

7-1 TORQUE REFERENCE (See Appendix A-2)

The torque reference is used when *Motor Ctrl Mode* / *Motor Ctrl Mode2* is selected for torque control. The reference can be used with speed control as a torque limit.

7-1.1 TORQUE REFERENCE BLOCKS

Parameters	Type	Default
<i>En Trq RefA</i>	BCFG	<i>Zero Bit</i>
<i>En Trq RefB</i>	BCFG	<i>Zero Bit</i>
<i>En Trq RefC</i>	BCFG	<i>Zero Bit</i>
<i>Trq Ref</i>	ACFG	<i>Trq Ref StA = 0.0</i>
<i>Trq RefB</i>	ACFG	<i>Trq Ref StB = 0.0</i>
<i>Trq RefB Mlt</i>	ACFG	<i>Trq RefB MSt = 1.00</i>
<i>Trq RefB Div</i>	CAL	<i>1.00</i>
<i>Trq Ref C</i>	ACFG	<i>Trq Ref StB = 0.0</i>
<i>Control Place</i>	CAL	<i>0</i>
<i>Trq Dir</i>	BCFG	<i>Zero Bit</i>
<i>Keypad_Trq_Dir</i>	DPB	

Control Place determines if the reference is coming from the keypad or from the reference sum block. It also determines where the invert reference bit comes from.

A sum block adds together the inputs that are enabled. The main torque reference is usually configured to *Trq Ref*. *Trq RefB* and *Trq Ref C* are used for load sharing. *Trq RefB* is used if a ratio load share is desired, while *Trq Ref C* is used for a difference sharing.

If *Control Place* is set for local control, then the torque reference comes from the drive's keypad.

The torque polarity is set by either *Trq Dir* or *Keypad Trq Dir* depending on *Control Place*.

7-1.2 TORQUE REFERENCE ENABLE, RAMP AND LIMITS

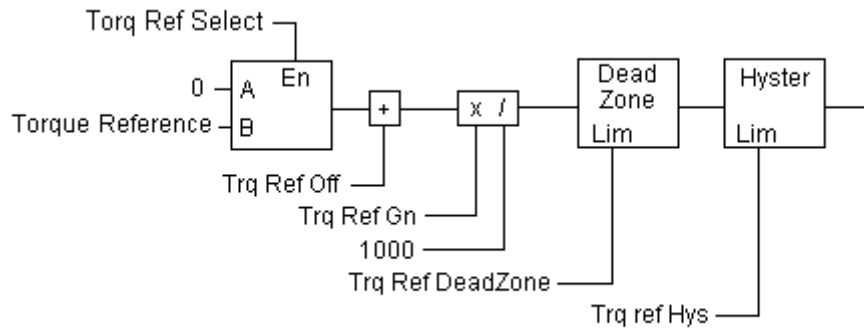
Parameters	Type	Default
<i>Trq Ref En</i>	BCFG	Zero Bit
<i>Trq No Ramp</i>	BCFG	One Bit
<i>Trq Rmp Rate</i>	CAL	5 % / second
<i>Trq_Ref_Min</i>	CAL	100.0%
<i>Trq Ref Max</i>	CAL	0%
<i>Torque Reference</i>	APB	

To enable the torque reference, *Motor Ctrl Mode* must be selected as torque control and *Trq Ref En* must be set high.

The Torque reference can go through an optional ramp limiter. To enable this, set *Trq No Ramp* to Zero Bit. *Trq Rmp Rate* is entered in % torque per second rate.

The reference is then checked for its limits before going to the firmware as *Torque Reference*.

7-1.3 TORQUE REFERENCE FIRMWARE, PART I



Parameters	Type	Default
<i>SC Trq Chain Sel</i>	En	0 = Not used
<i>Torque Ref Select</i>	En	0 = Not Used
<i>Torque Reference</i>	APB	
<i>Trq Ref Gn</i>	CAL	1000
<i>Trq Ref Off</i>	CAL	0
<i>Trq Ref DeadZone</i>	CAL	0
<i>Trq Ref Hyst</i>	CAL	0

SC Trq Chain Sel determines the operation of the torque reference as follows:

- 0 = Not Used
- 1 = Torque limit to the speed loop
- 2 = Torque reference added to speed loop (Or only reference)
- 4 = Position control (See closed loop speed loop description)

Torque Ref Select enables *Torque Reference* setpoint.

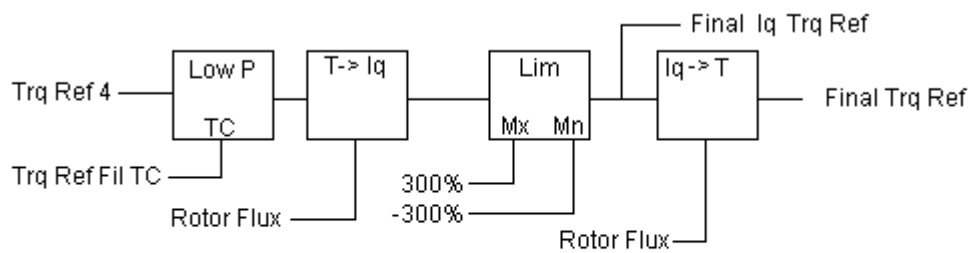
$$\text{Trq Ref 3} = (\text{Torque Reference} + \text{Trq Ref Off}) \times \text{Trq Ref Gn} / 1000$$

The torque reference is forced to zero if it is less than +/- *Trq Ref DeadZone* in percent torque. This is used to ignore small values.

Trq ref Hys sets a limit around zero to which the setpoint will not be allowed to go. The polarity of the torque will depend on the polarity of the Torque command when it falls below this limit.

Trq Ref 4 is the value after the dead zone and hysteresis blocks.

7-1.4 TORQUE REFERENCE FIRMWARE, PART II



Parameters	Type	Default
<i>Trq Ref Fil TC</i>	CAL	0 ms
<i>Torque Step</i>	CAL	0
<i>Final Iq Trq Ref</i>	APB	
<i>Final Trq Ref</i>	APB	

Trq Ref 4 goes through a second order low-pass filter with a time constant of *Trq Ref Fil TC*.

Torque Step is available for the ADDaptACC program to provide step changes for tuning.

The reference is then converted to motor current by taking into account the estimated *Rotor Flux*.

After being checked to be within +/- 300% current, the *Final Iq Trq Ref* is created. Also, converting back to torque reference is done to create *Final Trq Ref*.

7-2 OPEN LOOP CONTROL (See Appendix A-9)

Open loop control is set by having *Motor Ctrl Mode* = 0 – 2.

- 0 = Frequency control (Volts/Hertz)
- 1 = Open loop speed control (Open loop vector speed control)
- 2 = Open loop torque control (Open loop vector torque control)

Each mode has its own regulator scheme. In each open loop mode there are three stabilizers: Torque, DC-Link, and Flux. Each of these are factory-set, but are explained for reference.

7-2.1 TORQUE STABILIZER

The Torque stabilizer is used to dampen possible oscillations in the estimated torque calculations. This loop comes into affect above 3 hertz and is factory tuned. The reference to the controller is the derivative of the estimated torque value. The stabilizer control is a proportional-only controller with a variable gain. The gain is changed linearly between zero and field weaken frequency. The Zero and field weaken gain points are be TorqStabGain and TorqStabGainFWP.

TorqStabGainHwDtcFWP is an additional gain with dead time compensation above the field weaken point.

The output of the regulator is also limited by TorqStabLimit. The output of the controller goes through a damping block to reduce spikes from the derivative input based on parameter *TorqStabDamp*.

The torque stabilizer is factory set and the parameters are not editable.

TorqStabGain = 100 gain
TorqStabGainFWP = 50 gain
TorqStabGainHwDtcFWP = 50
TorqStabLimit. = 150 Hz/FreqScale
TorqStabDamp = 900

7-2.2 DC-LINK STABILIZER

The DC-link Stabilizer operates similar to the Torque stabilizer and also operates above 3 hertz. The reference to the controller is the derivative of the DC-link voltage. The proportional gain is variable by estimated motor torque. As the torque increases from 10% to 50%, the controller gain decreases from VoltStabGain to zero gain.

VoltStabGainHwDtc is an additional gain with dead time compensation.

The output of this stabilizer is limited by VoltStabLimit. The output of the controller goes through a damping block to reduce spikes from the derivative input based on parameter VoltStabDamp.

The Voltage stabilizer is factory set and the parameters are not editable.

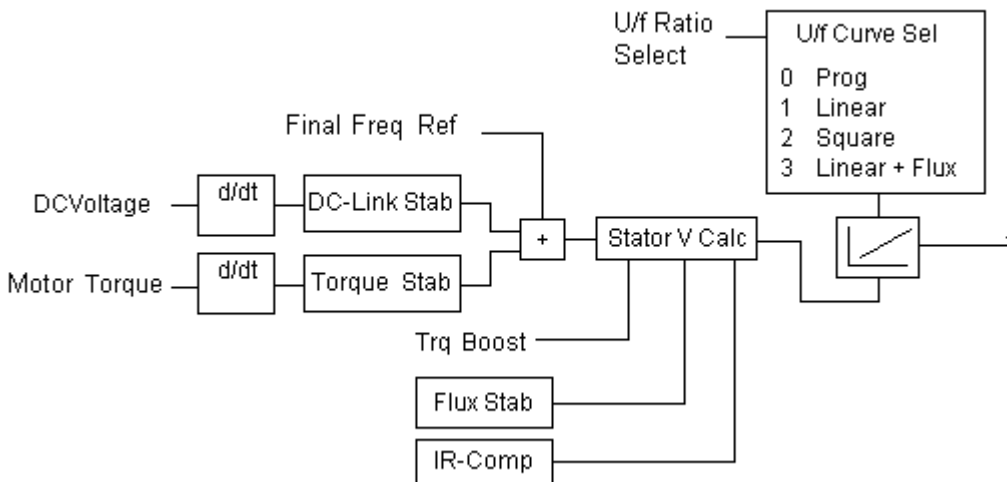
VoltStabGain = 100 gain
VoltStabGainHwDtc = 50 gain
VoltStabLimit = 150 Hz/FreqScale
VoltStabDamp = 900

7-2.3 FLUX STABILIZER

The Flux stabilizer purpose is to stabilize the magnetizing current. The error to the controller is from the difference between filtered and unfiltered magnetizing current. The filtered signal has a time constant of ldsFiltCoeff (in ms). The Flux stabilizer is a proportional-only controller with a gain of ldsStabGAinRef.

The Flux stabilizer is factory set and the parameters are not editable.

ldsFiltCoeff = 64 ms.
ldsStabGAinRef = 500 gain

7-2.4 OPEN LOOP FREQUENCY REFERENCE (*Motor Ctrl Mode* = 0)

Parameters	Type	Default
<i>Motor Ctrl Mode</i>	CAL	0 = Open Loop Frequency mode
<i>DCVoltage</i>	APB	
<i>Motor Torque</i>	APB	
<i>Freq out</i>	APB	
<i>U/f Optimization</i>	CAL	0
<i>Meas Rs V Drop</i>	CAL	0
<i>Ir Add Mtr Scl</i>	CAL	100
<i>Ir Add Gen Scl</i>	CAL	0
<i>Ir Add 0 Pt V</i>	CAL	0
<i>U/F Ratio Select</i>	CAL	0 = Linear
<i>Zero Freq Voltg</i>	CAL	0
<i>Voltage at FWP</i>	CAL	100.00
<i>U/F Mid Freq</i>	CAL	50.00 HZ
<i>U/F Mid Voltg</i>	CAL	100.00

If *Motor Ctrl Mode* = 0, then *Freq out* becomes the drives motor frequency reference in volts per hertz mode.

The torque and DC-link voltage stabilizer output is added straight to the frequency reference. Both of these stabilizers are zero mean additions to the output frequency. The Torque stabilizer is to dampen possible oscillations in the estimated torque calculations and DC-Link stabilizer is to dampen changes in the DC bus voltage.

The Stator Voltage calculation block takes the output of *Freq out* modified by the stabilizers and calculates the correct stator voltage. Inputs to this calculation are the torque boost and IR compensation.

Torque boost is enabled by setting *U/F Optimization* = 1. The torque boost is to compensate for the voltage drop due to stator resistance. This is done in the following ways.

- If the *Meas Rs V Drop* is set, then this value is used. This can be set by the user or the drive will calculate it if DC-brake is active for longer than two seconds.
- If the *Meas Rs V Drop* is not used, then the drive will estimate the voltage drop. This estimation can be viewed at *DefRsVoltageDrop*.

The IR compensation scaling is broken up into two values, depending if the drive is in motoring or in generation mode. The two variables are *Ir Add Mtr Scl* and *Ir Add Gen Scl*. These are scaled in percentage of the amount to add to the reference. The IR compensation value then goes through a low-pass filter with a time constant of *IrAddFilterTC*, which is hard coded to 8 ms. The gain of this filter goes from zero to full scale at *IrAddFreqLimit*, which is hard coded to 1 Hz. Between zero and this *IrAddFreqLimit*, a constant voltage *IrAddZeroPointVoltage* can be added.

The output voltage is then determined by going through one of three volts per hertz curves. Selection of a curve is done with the *U/F Ratio Select* parameter.

- *U/F Ratio Select* = 0 = Linear curve – As the name implies, this performs a linear curve between the *Zero Freq Voltg* and *Voltage at FWP*. *Zero Freq Voltg* is entered in percent of nominal voltage and is the starting voltage for the drive.

Voltage at FWP is entered in percent of nominal voltage and is the ending voltage when the field weakening frequency has been reached.

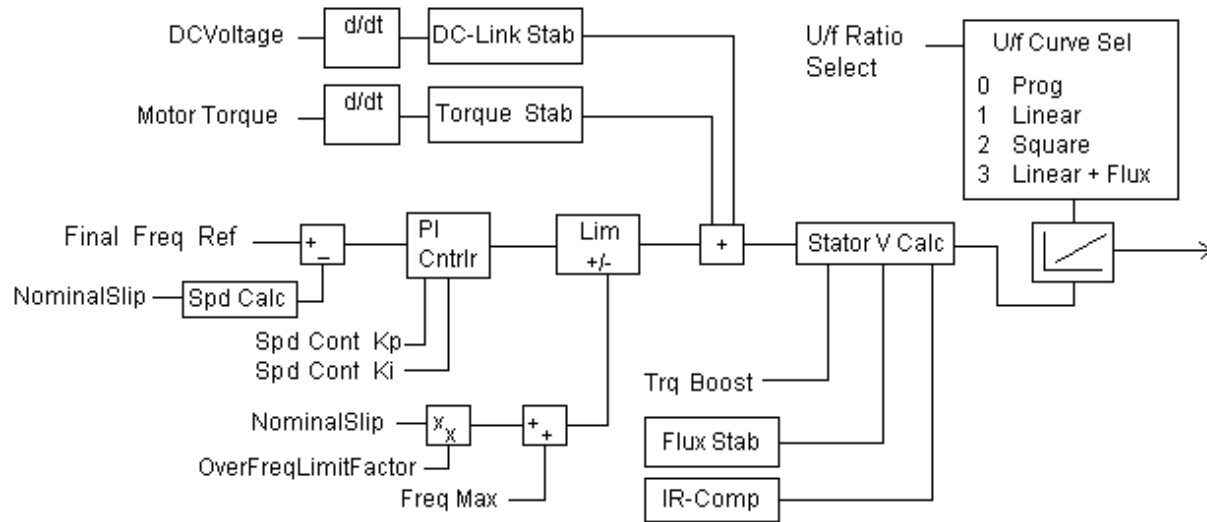
- *U/F Ratio Select* = 1 = Squared – The same parameters as Linear curve are used except, instead of a linear interpolation between the two points, a squared curve is used.
- *U/F Ratio Select* = 2 = Programmable – This is automatically selected if the drive has completed its identification with run and built the frequency-to-voltage curve. Three voltage, frequency points are found and used to define the curve. The points are:

UFZeroPointVoltage

U/f Mid Freq

Voltage at FWP

- *UFRatio* = 3 = Linear with Flux optimization – Uses the linear curve with voltage being drooped during constant operation. The advantage if this modification is to reduce motor losses. The disadvantage is a lag in the torque loop.

7-2.5 OPEN LOOP SPEED CONTROL (*Motor Ctrl Mode* = 1)

Parameters	Type	Default
<i>Motor Ctrl Mode</i>	CAL	0 = Open Loop Frequency mode
<i>Freq out</i>	APB	
<i>Spd Cont Kp</i>	CAL	3000 Gain
<i>Spd Cont Ki</i>	CAL	300 Gain
<i>Freq Max</i>	CAL	60 Hz

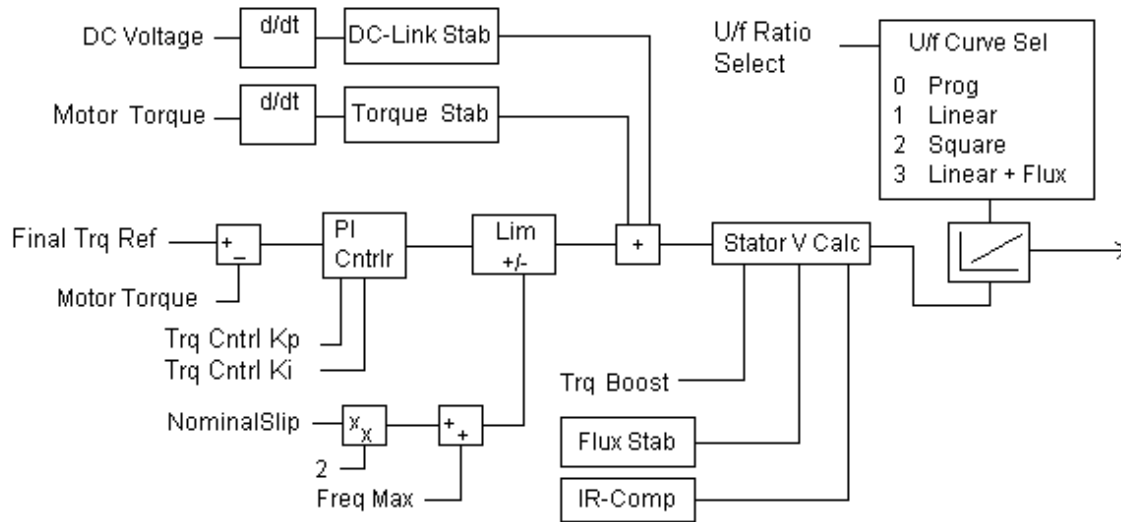
If *Motor Ctrl Mode*= 1, then *Freq out* becomes the drive's open loop speed reference.

The motor speed feedback is calculated from the motor voltage and the estimated slip value (*NominalSlip*).

The error is then passed to a Speed PI regulator. The proportional gain is set by *Spd Cont Kp* and the integral gain is set by *Spd Cont Ki*.

The output of the PI regulator is limited to *Freq Max* plus the value of *NominalSlip* x *OverFreqLimitFactor*. *OverFreqLimitFactor* is factory-set for 300 and allows the motor to get to its rated speed.

After the frequency limiter, the reference goes through the same stabilizers and volts per hertz curve as the open loop frequency reference. See the section prior to setup of these control sections.

7-2.6 OPEN LOOP TORQUE CONTROL (*Motor Ctrl Mode* = 2)

Parameters	Type	Default
<i>Motor Ctrl Mode</i>	CAL	0 = Open Loop Frequency mode
<i>Final TrqRef</i>	APB	
<i>Motor Torque</i>	APB	
<i>Trq Cntrl Kp</i>	CAL	150 Gain
<i>Trq Cntrl Ki</i>	CAL	10 Gain
<i>Freq Max</i>	CAL	60 Hz
<i>Torq Speed Limit</i>	E	1 = Freq Ref

If *Motor Ctrl Mode* = 2, then *Final Trq Ref* becomes the drive's open loop torque reference. See section 7-1 for the origin of this signal.

The drive goes into torque control if the drive is not in a limit controller and if the operating frequency is above 3 Hertz. The error from *Final Trq Ref* and *Mtr Torq Unfil* passes to a torque PI regulator. The proportional gain is set by *Trq Cntrl Kp* and the integral gain is set by *Trq Cntrl Ki*.

The output of the torque PI regulator is limited to *Torq Speed Limit* plus the value of *NominalSlip* x 2. This allows the motor to get to its rated speed. *Torq Speed Limit* can be set to either *Freq Max* or *Freq Ref*.

After the frequency limiter, the reference goes through the same stabilizers and volts per hertz curve as the open loop frequency reference. See the section prior to setup of these control sections.

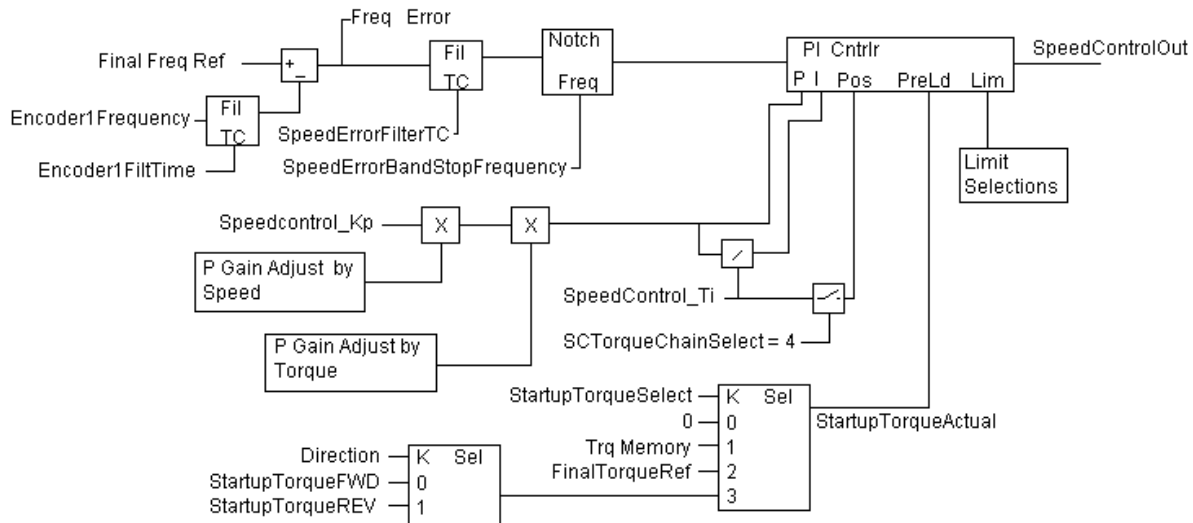
7-3 CLOSED LOOP CONTROL (See Appendix A-10)

Closed loop control is set by having *MotorControlMode*= 3 or 4.

3 = Closed loop speed control

4 = Closed loop torque control

7-3.1 CLOSED LOOP SPEED CONTROL (*Motor Ctrl Mode* = 3)



Parameters	Type	Default
<i>Motor Ctrl Mode</i>	CAL	0 = Open Loop Frequency mode
<i>Final Freq Ref</i>	APB	
<i>Encoder1FiltTime</i>	CAL	0 ms
<i>Freq Error</i>	APB	
<i>Spd Err Fil TC</i>	CAL	0 ms
<i>Spd Err LP Freq</i>	CAL	100 Hz
<i>Spd Err Bnd Frq</i>	CAL	0 Hz
<i>Speed Control Kp</i>	CAL	30 Gain
<i>Speed Control Ti</i>	CAL	30.0 ms
<i>Spd Cntrl F0</i>	CAL	0 Hz
<i>Spd Cntrl F1</i>	CAL	0 Hz
<i>Spd Cntrl Kp F0</i>	CAL	100%
<i>Spd Cntrl Kp FW</i>	CAL	100%
<i>Spd Cntrl Kp T0</i>	CAL	100%
<i>Spd Cntrl T0</i>	CAL	
<i>SC Trq Chain Sel</i>	CAL	0 = Not Used.
<i>Startup Trq Sel</i>	CAL	0 = No Preload
<i>StartupTorq FWD</i>	CAL	0%
<i>StartupTorq REV</i>	CAL	0%
<i>Mtr Cur Lim Scl</i>	ACFG	<i>Mtr Cur Limit</i> = 100%
<i>Final Trq Ref</i>	APB	
<i>Motoring Trq Lim</i>	CAL	300%
<i>Gener Trq Lim</i>	CAL	300%
<i>Trq Lim FWD</i>	CAL	300%

Parameters	Type	Default
<i>Trq Lim REV</i>	CAL	300%
<i>Speed Cntrl Out</i>	APB	

If *Motor Ctrl Mode* =3, then *Final Freq Ref* becomes the drive's closed loop speed reference. See Speed Reference (section 6-1.1) and Speed Step Reference (section 6-1.2) in this manual for the origin of this signal.

The Speed feedback comes from the first encoder board input detected by the drive. This value is represented on the diagram as *Encoder1Frequency* but is not available for viewing. This frequency can be filtered by a low pass filter with a time constant of *Encoder1FilTime*.

The speed loop error signal is can be viewed with the parameter *Freq Error*, which is in Freqscale units.

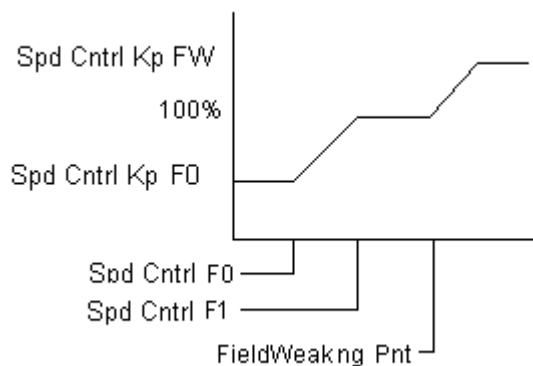
The error signal passes through two filters before going to the PI regulator. The first filter is a low pass filter with a time constant of *Spd Err Fil TC* and a cutoff frequency of *Spd Err LP Freq*. The second is a notch filter centered around *Spd Err Bnd Frq*.

The filtered error is then passed to the speed loop PI regulator. This regulator is an anti-windup proportional integrator controller with variable gains.

The standard proportional gain is set by *Speed Control Kp*. The standard integral component is a ratio of the *Speed Control Kp* / *Speed Control Ti*.

Two algorithms are used to modify the speed loop gains. Both are defaulted such that 100% of *Spd Cntrl Kp* goes to the controller.

A) P Gain Adjust by Speed



The P gain adjust by speed has two parts associated with it: First, the gain can be modified at lower frequencies, and gain modified above the field weaken range. *Spd Cntrl F0* and *Spd Cntrl F1* define the frequency window which will modify the gain. The block gain will change linearly from the setpoint *Spd Cntrl Kp F0* at *Spd Cntrl F0* to 100% at *Spd Cntrl F1*.

Second, the gain can then be modified in the field weakened range. The percent output will increase linearly from 100% to *Spd Cntrl Kp FW* when the motor speed reaches maximum frequency.

B) P Gain Adjust by Torque

Spd Cntrl Kp T0 is the P gain percent adjust at zero torque. The percentage will go to 100% when torque reaches the *Spd Cntrl T0* point.

The Speed loop regulator has the option for Type II speed control or position control. This is enabled by setting *SC Trq Chain Sel* = 4. When enabled, a second proportional gain equal to *Speed Control Ti* is added to the integrator error. The idea is to keep zero position error by keeping the speed loop integrator equal to zero. When activated, *Speed Control Ti* may need re-tuning.

C) Closed Loop Speed Control Preload

The speed loop can be preloaded on start to provide initial torque. Preload can come from four sources, depending on *Startup Trq Sel*.

- *Startup Trq Sel* = 0 (Default) No preload.
- *Startup Trq Sel* = 1 (Torque Memory). The torque the drive was commanding prior to the last stop command being activated will be used.
- *Startup Trq Sel* = 2 (Torque Reference). The regulator will be preloaded with *Final Trq Ref* value. See section 7-1 for configuration.
- *Startup Trq Sel* = 3 (Starting Torque Setpoint). Depending on the direction commanded on the start, will decide if *Startup Torq FWD* or *Startup Torq REV* will be used to preload the regulator.

D) Closed Loop Speed Regulator Output Limits

The output of the speed control regulator has several limits that can be applied. Some are based on which quadrant the drive is running. The final limit is the least value of all of the following and can be viewed at *MotorCurLimit*.

Mtr Cur Lim Scl is a percentage of the *Motor Nom Currnt* setpoint that is used as the main current limit. This limits the current in all quadrants. It is defaulted to 100%, which is the lowest default limit. Since *CurrentLimitOption.B0* is factory-set to zero, this current limit is the motor maximum current times the motor's power factor.

The overvoltage limiter controller will also limit the speed loop output if enabled. See section 6-2.6.

If *SC Trq Chain Sel* is set = 1, then *Final Trq Ref* becomes an output limit to the controller.

1. Quadrant #1: Forward Motoring

- *Motoring Trq Lim* which is defaulted to 300%
- *Trq Lim FWD* which is defaulted to 300%
- *MotoringPowerLim* which is factory set at 300%

2. Quadrant #2: Reverse Generating

- *Gener Trq Lim* which is defaulted to 300%
- *Trq Lim REV* which is defaulted to 300%
- *GeneratorPowerLim* which is factory set at 300%

3. Quadrant #3: Reverse Motoring

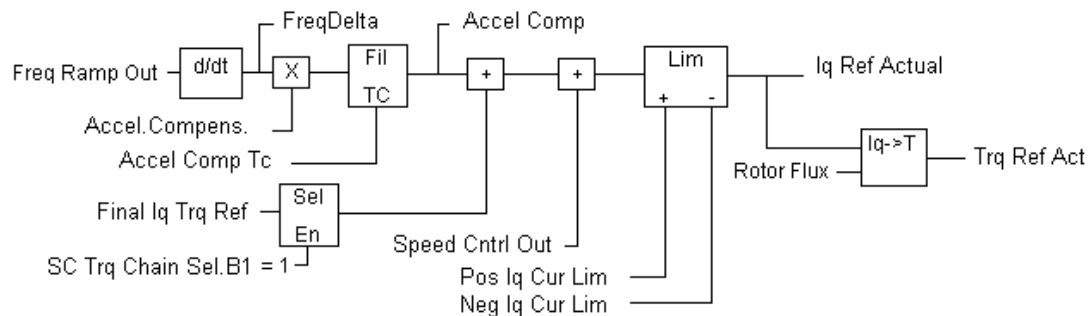
- *Motoring Trq Lim* which is defaulted to 300%
- *Trq Lim REV* which is defaulted to 300%
- *MotoringPowerLim* which is factory set at 300%

4. Quadrant #4: Forward Generating

- *Gener Trq Lim* which is defaulted to 300%
- *Trq Lim FWD* which is defaulted to 300%
- *GeneratorPowerLim* which is factory set at 300%

E) Closed Loop Speed Control Current Reference

The output of the speed regulator can be viewed at *Speed Cntrl Out* in percent motor torque.



Parameters	Type	Default
<i>Freq Ramp Out</i>	APB	
<i>FreqDelta</i>	APB	
<i>Accel.Compens.</i>	CAL	0 s
<i>Accel Comp Tc</i>	CAL	0 ms

Parameters	Type	Default
<i>Accel Comp</i>	APB	
<i>Final Iq Trq Ref</i>	APB	
<i>SC Trq Chain Sel.B1</i>	CAL	0 Not Used
<i>Speed Cntrl Out</i>	APB	
<i>Rotor Flux</i>	APB	
<i>Trq Ref Act</i>	APB	

The output of the speed loop regulator gets added to the inertia compensation and optional torque adder reference.

The inertial compensation value is determined by taking the derivative of *Freq Ramp Out*, which will yield the acceleration rate in motor hertz per second (*FreqDelta*). *Accel.Compens.* is the gain of the inertia compensation. This value is scaled in the amount of time it takes to accelerate the drive with nominal torque to nominal speed. If *Freq Ramp Out* is coming from an external signal a low pass filter is required to make the gain stable. *Accel Comp Tc* is the time constant in ms for this filter. The inertia compensation torque reference can be viewed at *Accel Comp*.

Final Iq Trq Ref is the output of the torque reference blocks and can be configured to add to the speed controller output. This would be used as a load anticipation signal.

After the signals are added together, the sum is then checked to be within the torque and current limits as defined based on the quadrant the drive is running. See the section before for details.

The reference can be viewed as torque using *Trq Ref Act*.

7-3.2 CLOSED LOOP TORQUE CONTROL (*Motor Ctrl Mode* = 4) (See Appendix A-2)

Parameters	Type	Default
<i>Final Trq Ref</i>	APB	
<i>Final Iq Trq Ref</i>	APB	
<i>TC Pos Freq Lim</i>	APB	
<i>TC Neg Freq Lim</i>	APB	
<i>TC Spd Lim Sel</i>	CAL	0 – No ramping
<i>Trq Spd Lim Mode</i>	CAL	0 – Max Min
<i>Freq Ramp Out</i>	APB	
<i>Win Pos Width</i>	CAL	0 Hz
<i>Win Neg Width</i>	CAL	0 Hz

In closed loop torque control, *FinalTrq Ref* and *Final Iq Trq Ref* is used as the drive's torque command. See section 7-1 for how to setup the references.

While in closed loop torque control, there are several methods to limit the motor's speed. To use these, it must be noted that the speed loop must be tuned for stable operation. The method is selected by *Trq Spd Lim Mode* and *TC Spd Lim Sel* parameters. The output limits of the different methods can be viewed by *TC Pos Freq Lim* and *TC Neg Freq Lim*.

- A) *Trq Spd Lim Mode* = 0 = Maximum Limits. The section will be in torque control until motor speed exceeds either *PosFreqMaxActual* or *NegFreqMaxActual*.
- B) *Trq Spd Lim Mode* = 1 = Absolute value of speed reference. The section will be in torque control until the motor exceeds the absolute value of *Freq Ramp Out*, which is the ramped speed reference.
- C) *Trq Spd Lim Mode* = 2 = Speed reference and Min Frequency. The section will be in torque control until the motor exceeds *Freq Ramp Out* or *NegFreqMaxActual*.
- D) *Trq Spd Lim Mode* = 3 = Max frequency and Speed reference. The section will be in torque control until the motor exceeds *PosFreqMaxActual* or *Freq Ramp Out*.
- E) *Trq Spd Lim Mode* = 4 = Window. The section will be in torque mode as long as the speed is within a window around *Freq Ramp Out*.

The positive side is *Freq Ramp Out* + *Win Pos Width*. The negative side = *Freq Ramp Out* – *Win Neg Width*.

- F) *Trq Spd Lim Mode* = 5 = Speed reference and zero. The section will be in torque control until the motor exceeds *Freq Ramp Out* and zero frequency. *Freq Ramp Out* is either the maximum limit or the minimum limit based on motor direction.
- G) *Trq Spd Lim Mode* = 6 = Window select. This mode is not available and should not be selected.

The changes to *TC Pos Freq Lim* and *TC Neg Freq Lim* can be ramped to avoid fast speed changes. These limits are changed when *Trq Spd Lim Mode* is changed while running or transferring into torque mode from speed control. The *TC Spd Lim Sel* word determines how the limits are ramped. *TC Spd Lim Sel* is defaulted to 0, which disables limit ramping.

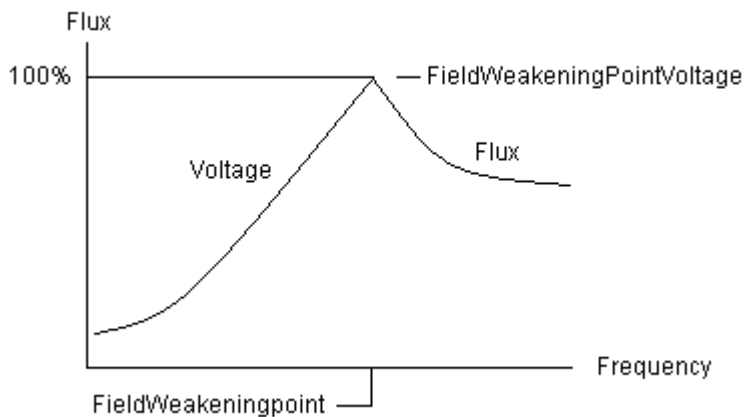
The speed reference ramp times are used when the limit ramping is enabled.

- A) *TC Spd Lim Sel.B0* = 1 = Ramp out of torque control. When enabled, the speed reference will ramp at its current value to *Freq Ramp Out* when the mode is transferred from torque control to speed control.
- B) *TC Spd Lim Sel.B1* = 1 = Smart ramp down. If the speed limit is reduced as a step change, the drive will ramp the limit from the current motor running speed to the new limit.
- C) *TC Spd Lim Sel.B2* = 1 = Ramp Up. If the speed limit is increased as a step change, the drive will ramp the limit up to its new value.
- D) *TC Spd Lim Sel.B3* = 1 = Ramp Down. If the speed limit is decreased as a step change, the drive will ramp the limit down to its new value.
- E) *TC Spd Lim Sel.B4* = 1 = Follow Actual. Used with *TC Spd Lim Mode* = 6, which is not available in this software version.
- F) *TC Spd Lim Sel.B5* = 1 = Force Ramp stop. On removal of run, the limits will step to the actual motor speed, then ramp to zero.
- G) *TC Spd Lim Sel.B6* = 1 = Max speed. Sets *TCPosFreqLimitActual* to motor speed when transitioning into torque mode from speed mode. If Ramp Up is also enabled, the upper limit will then ramp to its setpoint creating a smooth transition into torque mode.
- H) *TC Spd Lim Sel.B7* = 1 = Speed Limits. Similar to *TC Spd Lim Sel.B6*, except that both limits are set to the motor speed on the transition into torque mode. Then based on the Ramp Up and Ramp Down bits, they will ramp to the setpoints. Provides a smooth transition into torque mode regardless of if the torque is higher or lower than the desired torque when enabled.

7-3.3 FLUX REFERENCE (See Appendix A-11)

Parameters	Type	Default
<i>MagnCurrent</i>	CAL	Tune
<i>Motor Nom Currnt</i>	CAL	SetId
<i>Id Ref</i>	APB	
<i>Field Weakengpnt</i>	CAL	60.00 Hz
<i>Voltage at FWP</i>	CAL	100.00 volts
<i>Start DC-Brake Tm</i>	CAL	0 ms
<i>DC-Brake Current</i>	CAL	54.0 amps
<i>Strt 0 Spd Time</i>	CAL	100 ms.
<i>Stop 0 Spd Time</i>	CAL	100 ms.
<i>Stop St Magn I</i>	CAL	50%
<i>Stop St Magn Tim</i>	CAL	30 seconds

The magnetizing current reference for the motor is set by the parameter *Magn Current*. This value is in motor amps and gets converted to percentage by dividing it by *Motor Nom Currnt* x 100. This is the full magnetizing current during normal operation giving full rotor flux. Additional references are added before starting, after stop, and during field weakening operations. *Id Ref* is the final Id current reference.



Id Ref is adjusted during the field weakened range of the motor. *Field Weakengpnt* defines the frequency to start reducing the motor flux. The drive also monitors motor voltage and reduces the flux to keep the value below *Voltage at FWP*. Another voltage limit is also used to keep the motor voltage below the DC-Link voltage. The motor voltage is limited by *ModIndexLimit* x measured motor volts. *ModIndexLimit* is factory-set to 100%.

FluxCurrentRampTime defines the rate of change limit for the Flux current except at a start. This value is factory set to 200 ms.

At a run command, the flux has an accelerated ramp time defined by *StartBoostRiseTime* which is factory-set to 10 ms.

The time between when the drive is commanded to run and the ramp is released is defined by *Strt 0 Spd Time*. During that time, *DC-Brake Current* can be added for the length of time defined by *Start DC-Brake Tm*. After *Start DC-Brake Tm* has timed out, the flux returns to its full value by the *FluxCurrentRampTime*.

After the run command is removed and the section has ramped to zero, the motor flux stays at its nominal value until *Stop 0 Spd Time* has elapsed. The current then ramps to the *Stop St Magn I* percentage for the *Stop St Magn Tim*. This keeps the field at a lower level for a period of time for operations that perform a lot of quick start and stops.

7-3.4 FLUX MODELING (See Appendix A-11)

Parameters	Type	Default
<i>Slip Adjust</i>	CAL	100%
<i>Flux Curve a</i>	CAL	10%
<i>Flux Curve b</i>	CAL	20%
<i>Flux Curve c</i>	CAL	30%
<i>Flux Curve d</i>	CAL	40%
<i>Flux Curve e</i>	CAL	50%
<i>Flux Curve f</i>	CAL	60%
<i>Flux Curve g</i>	CAL	70%
<i>Flux Curve h</i>	CAL	80%
<i>Flux Curve i</i>	CAL	90%
<i>Flux Curve j</i>	CAL	100%
<i>Flux Curve k</i>	CAL	110%
<i>Flux Curve l</i>	CAL	120%
<i>Flux Curve m</i>	CAL	130%
<i>Flux Curve n</i>	CAL	140%
<i>Flux Curve_o</i>	CAL	150%

The flux model of the drive uses the motor nameplate data, measured currents, and motor speeds and outputs flux angle, rotor flux frequency, and flux amplitude. The flux angle is used to perform field-oriented control that separates the magnetizing current and torque producing current. The rotor flux frequency is used to control the field weakening operations. The estimated flux verses motor current is adjusted by the programmable flux curve.

The rotor time constant is needed to perform the flux model. This time constant is estimated from the nominal motor speed, current, frequency, and cos (magnetizing current). This calculated value is then adjusted by *Slip Adjust*. Slip adjust is for manual tuning of the motor slip. A value less than 100% decreases the slip which, in turn, increases the rotor time constant.

Motor magnetizing current is related to the estimated motor flux by a preset saturation curve. This curve has 15 points (*Flux Curve a* to *Flux Curve o*). Each point represents the flux at each step of the magnetizing current range, from 0 to 150% at 10% steps. The default is a linear line.

7-3.5 CURRENT CONTROL LOOP (See Appendix A-11)

Parameters	Type	Default
<i>CurrentControlKp</i>	CAL	4000 Gain
<i>Curr Cntrl_Ti</i>	CAL	15 ms
<i>Motor Type</i>	E	0 = Induction

In closed loop mode, a faster current control loop is selected. The motor phase currents are measured and the corresponding vector reference is calculated. The actual current regulation is performed with two PI controllers. The IdReference controller regulates magnetizing current. The IqReference controller regulates motor torque. *CurrentControlKp* and *Curr Cntrl Ti* modify the gain of the regulators.

The output of the current regulators determines motor voltage vector.

Other factors that determine the final current loop output are encoder angle calculation from the encoder, Motor CEMF, and inverter bridge dead time.

The current loop regulator runs at 140 microsecond time frame.

SECTION VIII

MISCELLANEOUS CONTROLS

This section deals with all the control blocks and firmware parameters that do not fit into any other category.

8-1 OVERSPEED AND AT ZERO SPEED (See Appendix A-8)

Spd Fdbk is defaulted to *Motor Speed* but can be reconfigured to an encoder input or analog input.

Spd Fdbk is passed through a low pass filter with a time constant of *Spd Cmp Fil TC* before it goes to the speed comparator.

The speed comparator setpoints are a percentage of the value *Ovr Spd Inp*, which is defaulted to parameter *Max RPM*.

The zero speed setpoint is defined by *Zero Detect* which is defaulted to 2.00%. *At Zero Spd* bit will go high when the percentage of *Spd Fdbk* falls below this value minus the hysteresis value *Spd Hyst*.

The Overspeed setpoint is defined by *Ovr Spd Stp*, which is defaulted to 110.00%. Over Speed will go high when the percentage of *Spd Fdbk* goes above this value plus the hysteresis value *Spd Hyst*.

Spd Decimal is defaulted to 2. Modify this if the compare block setpoint decimal place needs to be moved due to integer limitations.

8-2 MOTOR BRAKING (See Appendix A-11)

8-2.1 DC Braking

Parameters	Type	Default
<i>DC-Brake Current</i>	CAL	3.70 Amps
<i>MC Run</i>	DPB	
<i>Start DC-BrakeTm</i>	CAL	0.00 s
<i>DC Brk Cmd</i>	BCFG	Zero Bit
<i>Stop DC-BrakeFr</i>	CAL	1.50 Hz
<i>DC Tim Rmp Stp</i>	CAL	0.00 s
<i>DC Tim Cst Stp</i>	CAL	0.00 s
<i>DC Brake Current</i>	APB	

The drive can be setup to deliver DC current to the motor during start and stopping. This converts the regenerative power back into the motor windings causing heat. *DC Brk Cmd* enables this feature and *DC-Brake Current* sets the amount of amps to deliver to the motor.

On start DC can be injected into the motor to keep it from moving until brakes are released. *Start DC-BrakeTm* sets the amount of time to deliver the current.

During stop if enabled the drive will put out DC current when it reaches below the *Stop DC-BrakeFr* setting. It will keep the current on for the amount of time set by either *DC Tim Rmp Stp* or *DC Tim Cst Stp*.

8-2.2 Flux Braking

Parameters	Type	Default
<i>FluxBrakeCurrent</i>	CAL	3.70 Amps
<i>Flux Brake</i>	E	Off

Flux braking is similar to DC braking as it converts the stopping energy into motor heat. The difference is that instead of putting pure DC into the windings it controls a slip and voltage differential to be able to control the stop.

8-3 SWITCHING FREQUENCY (See Appendix A-11)

The motor switching frequency is set by *Switching Freq* parameter. The default for this is frame size dependent.

8-4 PARAMETER SETS

The Keypad can store two sets of parameter values. These can be downloaded or saved via the keypad menu. The drive can not be running during this transition. The logic in control block diagrams *Param_Set_1* and *Param_Set_2* prevents the transitions or starting a run before the transition is complete.

Warning: The drive does not know which parameter set is loaded.

SECTION IX

COMMUNICATIONS

The drive can communication through a wide variety of communication boards that can be inserted into slots D and E. Examples of some of the protocols include:

- Ethernet – Modbus TCP, Etherent IP, EGD
- Devicenet
- System Bus – Master Slave
- Profibus DP
- Modbus serial link

Each communication board has its own manual that details the protocol and connections. This section will discuss the generic software control blocks that are used for each protocol.

There are usually two methods of reading and writing data to the drive. The protocols either have preset messages such as defined in the EDS sheets for Devicenet or they can read or write to a particular address. The parameter ID number represents its address in most of the message structures. The drive appendices include the ID number with the parameter name. Not all parameters have an ID number.

ID numbers 0 – 1000 are designated for firmware variables.

ID numbers 1001 – 2000 are designated for the application variables.

9-1 READ AND WRITE STANDARD ID NUMBERS (See Appendix A-7)

The following parameters are set aside for write messages to the drive. The addresses are grouped together so one write message can get them all. The drive can then be configured to use these locations for proper function.

There are four words where bits can be written to:

- 1) *FB Fix Cntl Wrd* (ID 1621) – Depending on which protocol is used several of these bits are predetermined.
- 2) *FB Gen Cntl Wrd* (ID 1630) – None of the bits are predefined and open to user choice.
- 3) *FB Word Out 8*
(ID 1618) – Alternate word if more than one communication channel needs to write bits.
- 4) *SB In Cntl Word* (ID 1530) – Used for input bits from the system bus.

The above words can be unpacked to the following bits based on the selector.

ID	Parameter Name	Bit Location	Selector
1040	<i>FB Bit00</i>	0	<i>FB Bit Sel 1</i>
1041	<i>FB Bit01</i>	1	<i>FB Bit Sel 1</i>
1042	<i>FB Bit02</i>	2	<i>FB Bit Sel 1</i>
1043	<i>FB Bit03</i>	3	<i>FB Bit Sel 1</i>
1044	<i>FB Bit04</i>	4	<i>FB Bit Sel 2</i>
1045	<i>FB Bit05</i>	5	<i>FB Bit Sel 2</i>
1046	<i>FB Bit06</i>	6	<i>FB Bit Sel 2</i>
1047	<i>FB Bit07</i>	7	<i>FB Bit Sel 2</i>
1048	<i>FB Bit08</i>	8	<i>FB Bit Sel 3</i>
1049	<i>FB Bit09</i>	9	<i>FB Bit Sel 3</i>
1050	<i>FB Bit10</i>	10	<i>FB Bit Sel 3</i>
1051	<i>FB Bit11</i>	11	<i>FB Bit Sel 3</i>
1052	<i>FB Bit12</i>	12	<i>FB Bit Sel 4</i>
1053	<i>FB Bit13</i>	13	<i>FB Bit Sel 4</i>
1054	<i>FB Bit14</i>	14	<i>FB Bit Sel 4</i>
1055	<i>FB Bit15</i>	15	<i>FB Bit Sel 4</i>

Each bit selector unpacks four bits from any of the four field bus words.

Example:

If *FB Bit Sel 1* is set to Gen Ctrl W then *FB Bit00* – *FB Bit03* is unpacked from the first 4 bits of *FB Gen Cntl Wrđ*.

Write integer to the drive:

ID	Parameter Name
1611	<i>FB Word In 1</i>
1612	<i>FB Word In 2</i>
1613	<i>FB Word In 3</i>
1614	<i>FB Word In 4</i>
1615	<i>FB Word In 5</i>
1616	<i>FB Word In 6</i>
1617	<i>FB Word In 7</i>
1618	<i>FB Word In 8</i>
1619	<i>FB Word In 9</i>
1620	<i>FB Word In 10</i>

The following parameters are set aside for read messages from the drive. The addresses are grouped together so one read message can get them all. Any parameter with an ID number can be configured to these locations.

16 configurable points are available to pack bits into two words for reading by the communications. The bits are directly written in order to *FB Gen Sts Word*. All the bits except for the lower 4 are written to *SB Out Cntl Word*.

Read bits from the drive:

Configuration Parameter	Bit Set
<i>FB Bit Cfg Out00</i>	00
<i>FB Bit Cfg Out01</i>	01
<i>FB Bit Cfg Out02</i>	02
<i>FB Bit Cfg Out03</i>	03
<i>FB Bit Cfg Out04</i>	04
<i>FB Bit Cfg Out05</i>	05
<i>FB Bit Cfg Out06</i>	06
<i>FB Bit Cfg Out07</i>	07
<i>FB Bit Cfg Out08</i>	08
<i>FB Bit Cfg Out09</i>	09
<i>FB Bit Cfg Out10</i>	10
<i>FB Bit Cfg Out11</i>	11
<i>FB Bit Cfg Out12</i>	12
<i>FB Bit Cfg Out13</i>	13
<i>FB Bit Cfg Out14</i>	14
<i>FB Bit Cfg Out15</i>	15

Read integer from the drive:

ID	Parameter Name	Configuration Parameter
1622	<i>FB Word Out 1</i>	<i>FB Word Cfg Out1</i>
1623	<i>FB Word Out 2</i>	<i>FB Word Cfg Out2</i>
1624	<i>FB Word Out 3</i>	<i>FB Word Cfg Out3</i>
1625	<i>FB Word Out 4</i>	<i>FB Word Cfg Out4</i>
1626	<i>FB Word Out 5</i>	<i>FB Word Cfg Out5</i>
1627	<i>FB Word Out 6</i>	<i>FB Word Cfg Out6</i>
1628	<i>FB Word Out 7</i>	<i>FB Word Cfg Out7</i>
1629	<i>FB Word Out 8</i>	<i>FB Word Cfg Out8</i>

9-2 SPECIAL FIELD BUS VARIABLES

For certain predefined field bus messages, certain parameters are used in the firmware.

FBActSpd_ID is used for several predefined messages for Devicenet and Profibus DP. This parameter is set to *Motor Speed*.

FB Spd Ref is defaulted to get the desired reference by some field bus protocols. *Master Ref* needs to be configured to this to become the drives speed reference.

9-3 FAULTS

- A) Slot Fault – Field bus fault is set when either SlotDBoardStatus or SlotEBoardStatus indicates a problem. This bit can go to a fault block that can be configured for a drive warning or a fault.

- B) Watchdog Bit - Logic is built into the drive to allow for an external device to toggle a bit to create a communication watchdog. The system bus has separate watchdog timer logic.

Configure *Watchdog In* to the field bus input bit that the PLC is going to toggle.
Configure the fieldbus output bit to *Watchdog Out*.

The external device should read bit *Watchdog Out* and return the inverse of the bit that gets configured to *Watchdog In*.

When *Com WD* is enabled, Com WD fault will go high (*WD Trip*) after the bit stops toggling for *WD Com Dly* amount of time in ms.

WD Init Dly Tim delays this fault on power up to give the communications a chance to establish.

Set *WD Flt Response* for the action the drive will take on a communication failure.

9-4 SYSTEM BUS (See Appendix A-7)

The Stop Tape software supports the Master/Slave configuration of the system bus.

Each node on the network must have an ID from 0 to 63. *SBI d* sets the section ID. Also set *SBNextId* parameter for the next section's ID.

The parameter *SB Mode* determines if a drive is the master or a slave section. Only one master can be set up on the fiber network. The master sends out five integers which all slaves connected read and can act upon.

A) Master Section Output Packet

Integer	Parameter name	Description
1	<i>SB Out Cnt1 Word</i>	Control Bits
2	<i>Freq out</i>	Ramped speed reference
3	<i>Trq Ref Act</i>	Torque reference
4	<i>SB Out Int1</i>	Configurable variable
5	<i>SB Out Int2</i>	Configurable variable

B) Slave Section Input Packet

Integer	Parameter name	Description
1	<i>SB In Cnt1 Word</i>	Control Bits
1 bit 1	<i>MD Drive OK</i>	From master <i>MC Ready</i>
1 bit 2	<i>MD Run Enable</i>	From master <i>Run Enable</i>
1 bit 3	<i>MD Watchdog</i>	From master <i>SB WD Pulse</i>
2	<i>SB In Freq Ref</i>	Optional speed reference
3	<i>SB In Trq Ref</i>	Optional torque reference
4	<i>SB In Int1</i>	Unused variable
5	<i>SB In Int2</i>	Unused variable

C) Faults and Watchdog timer bit

The Master section sends out a watch dog bit called *SB WD Pulse* which toggles every 100 ms. This come into the slave as *MD Watchdog* which is the default to *MD WD*. If the bit does not toggle in 1 second, then *MD WD OK* will go low, which can be used to stop the section or fault the drive out.

The *MD_Watchdog* and *SB Comm Lost* bits are used to create *SB Comm Flt* after failure for *SB Comm Flt Tim* ms. When *SB Comm Flt* goes low, *SB Comm Flt Resp* will set a warning or fault the drive out.

SECTION X

FAULT CODES

(See Appendix A-8)

Drive faults can be derived from either hard coded firmware faults or from the application Fault block.

The firmware faults have no options associated with them. They will fault the drive with a coast stop and record the event in the FIFOs. *MC Fault* bit will go high when a fault has occurred and has not been reset. *MC Warning* goes high when a drive warning is active.

The application Fault block allows different options such as drive action, Stop type, recording, and ability to reset the fault. See the Fault block in the function block library for in depth description of the Fault block. Fault block triggers can come from either the firmware or from the application program.

10-1 FAULT ACTIONS

Fault action is decided by the FMode input of the Fault block. There are three options available.

- 0 = Disabled
- 1 = Warning – No drive action but the information is stored in the Fault FIFO
- 2 = Fault – Drive performs a stop.

10-2 STOP ACTION

The type of drive stop command is decided with the Stop input of the Fault block. There are three options available.

- 0 = Coast stop – Highest priority if multiple faults occur
- 1 = Normal stop mode
- 2 = Ramp stop.

10-3 FAULT RESET

A fault can be reset by several methods. The parameter *Fault Reset* will reset all active faults.

Each fault block also has an individual fault reset input, called Reset, that can be used.

The drive can be set up to auto reset on certain faults. The drive will allow the fault to auto reset so many times per the following table within *Auto Rst SVTime*. After a fault the drive will wait

Auto Rst Wait time before resetting. *Auto Rst StartM* determines how the drive will start after an auto reset (0 = Ramp, 1 = Flying start, 2 = Start Function parameter).

Fault Code	Fault Text	Trails
1	Overcurrent	<i>Auto Rst OC Trls</i>
2	Overvoltage	<i>Auto Rst OV Trls</i>
9	Undervoltage	<i>Auto Rst UV Trls</i>
16	Mot.Overtemp	<i>Auto Rst Mtr OT</i>
17	MotorUnderld	<i>Auto Rst Uload T</i>
31	IGBT Temp	<i>Auto Rst OC Trls</i>
41	IGBT Temp	<i>Auto Rst OC Trls</i>
51	Ext Fault	<i>Auto Rst ExtF T</i>

10-4 RECORDING

There are two fault FIFOs: active fault FIFO which records 10 faults, and history table FIFO that records 30 faults/warnings.

The Hist input of the Fault block determines how it is recorded into the FIFO. There are 4 options available:

- 0 = Fault always will be stored.
- 1 = If a fault occurs several times, each event will be logged unless they occur within the time frame defined by the Wait input. The wait input is set in 10 ms increments.
- 2 = Fault will be recorded if different than the previous fault recorded.
- 3 = Not recorded.

The last active fault code can be viewed at *Active Flt Last* value.

10-5 DRIVE FAULTS

Fault Code	Fault Text	Possible Cause	Solution
1	Overcurrent	Over 400% nominal current detected. - Sudden increase in load. - Needs tuning - Shorted motor / cables - Unsuitable or bad motor	- Check section for binding or excessive loads. - Check motor tuning - Check motor leads and motor shorts - Replace drive - Replace motor
2	Overvoltage	DC bus has exceeded its upper limit. - Braking resistor not working properly - Deceleration too rapidly - Unstable or utility voltage spikes.	- Check brake resistor and chopper unit - Check deceleration rates - Verify proper incoming voltage
3	Earth Fault	Sum of motor current do not equal zero. - Motor cable or motor short to ground. - Bad current sensing	- Check motor cables for shorts to ground - Check motor for short to ground. - Replace drive inverter.
5	Charging Switch	The charging switch was open when a run command was given. - Faulty operation - Component Failure	- Reset the fault and try to restart. - Replace charging unit
6	Emergency Stop	Input board not found or not seated properly.	- Reseat I/O boards. - Replace I/O boards.
7	Saturation	Very high overload - Cable / motor short - Defective component	- Cannot be reset must cycle power. - If occurs with Fault #1 then check motor and motor cables.
8	System Fault	Additional information will be stored in FIFOs. - Component Failure	- Replace processor board.
9	Undervoltage	DC bus has dropped below its lower limit. - Supply voltage too low - Converter fault - Excessive loading	- Check incoming voltage level - Check for Convert fault - Check motor loading - Replace converter
10	Input Phase	Input line phase missing. - Bad external fuse - Bad voltage sensing	- Check each input phase - Replace Converter
11	Output Phase	No current detected in one of the output motor leads. - Bad motor lead or motor. - Bad current sensor	- Check motor cables for an open phase. - Check motor for open winding - Replace Drive inverter
12	Brk Chopper Supr	Brake Chopper operation failure. - Bad resistor - Chopper failure	- Check and replace braking resistor - Replace brake chopper components
13	Undertemp	Heat sink temperature under -10°C. - Ambient temperature too low. - Thermister failure	- Heat drive enclosure - Replace drive power components.
14	Overtemp	Heatsink over 90° C. - Ambient temperature too high. - Drive cooling not adequate - Bad temperature sensor	- Lower drive enclosure ambient temperature. - verify fan operation

Fault Code	Fault Text	Possible Cause	Solution
15	Motor Stall	Motor stall protection tripped. - Motor is binding - Not enough motor torque available. - Stall protection set too tight.	- Check to make sure motor is not binding. - Retune to get proper magnetizing current. - Check stall protection for proper setup. - Verify motor is getting current. - Replace motor - Replace inverter
16	Mot.Overtemp	Motor over heating detected by temperature model.	- Check for excessive motor loading - Check motor cooling - Check motor current to verify proper tuning.
17	MotorUnderld	Motor underload protection trip.	- Check process for load. - Check shafts and couplings - Check Under load parameters for proper setting.
22/23	Chksum Flt	EEProm has checksum fault.	- Verify parameters are set properly - Replace microprocessor board.
24	Changed data warning	Changes may have occurred during power interruption	- Check parameters against saved file - re-download parameters - Replace microprocessor board.
25	Micro Watchdog	Microprocessor timed out.	- Redownload the system and application software. - Replace microprocessor board.
29	Thermistor	Thermistor out of range.	- Replace thermistor
31	IGBT Temp	IGBT temperature exceeded its limit.	- Check ambient temperature - Check drive fan - Check for excessive build up of material on heat sink - Observe operation for high drive loading.
32	Fan cooling	Detection of a fan failure	- Replace Fan - Replace Fan controller - Replace drive
37	Device Change	Option board changed.	- Enter correct parameters for new option board. - Check I/O board seating - Replace option board.
38	Device Added	Option board or different drive size changed.	- Enter correct parameters for new hardware. - Check I/O board seating. - Check microprocessor board connection. - Replace drive
39	Device Removed	Option board or drive removed from microprocessor.	- Check I/O board seating - Check microprocessor board connection. - Replace drive.
40	Device Unknown	Unknown option board added to the drive.	- Check I/O board seating - Replace I/O board
41	IGBT Temp	Same as fault 31	Same as fault 31
50	Anlg In Flt	Analog input is below its low limit.	- Check signal source - Check connections - Verify correct option board and jumpers. - Replace option board
51	Ext Fault	User configured PB_Ext_Fault_Inp is high.	- Determine external fault reason - Verify proper external fault setup
52	Keypad Comm	Connection between keypad and drive is broken.	- Verify keypad cable connections or proper seating of keypad - Replace keypad - Replace microprocessor board.

Fault Code	Fault Text	Possible Cause	Solution
53	FBCommunicat	Field bus fault fro D_FB_Fault bit. Bit is set when board failure is noted	- Check fieldbus board seating. - Replace fieldbus board
54	Slot Communic	Communication to a smart I/O option board is lost	- Check board seating in slots C-E. - Replace option boards - Replace microprocessor board
56	PT100 Temp	PT100 exceeds either the temperature warning or fault limit	- Check device for over heating. - Check PT100 device - Check for proper temperature probe connections. - Check for proper limits - Replace PT100 option board
57	Identification	Identification is completed	- Verify Identification parameter is set to a value other than 0.
60	Com Watchdog	Communication watchdog bit is not toggling	- Verify communications is working. - Verify watchdog bit is being toggled by host device.
61	User Fault 1	PB_User_Flt_1 is configured to a value that is High.	- Check configuration for function.
62	User Fault 2	PB_User_Flt_2 is configured to a value that is High.	- Check configuration for function.
63	User Fault 3	PB_User_Flt_3 is configured to a value that is High.	- Check configuration for function.
64	User Fault 4	PB_User_Flt_4 is configured to a value that is High.	- Check configuration for function.
65	Overspeed Flt	Drive tripped out on overspeed.	- Check for sudden loss of load. - verify proper speed feedback device and scaling. - Check overspeed setup
66	SB Comm Fault	System bus watchdog trip or board failure.	- Verify all drives on the system bus is up and running. - Verify system bus cabling. - Replace system bus cabling - Replace system bus board.
70	Loc Stop Flt	Keypad stop button pressed for two seconds.	- Replace keypad.

10-6 DRIVE FAULT OPTIONS

Fault Code	Fault Text	Fault Mode	Stop Mode	Warning Bit
1	Overcurrent	Fault	Coast Stop	OC Warn
2	Overvoltage	Fault	Coast Stop	OV Warn
3	Earth Fault	<i>Earth Fault</i>	<i>Earth Fault</i>	
5	Charging Switch	Fault	Coast Stop	
6	Emergency Stop	Fault	Coast Stop	
7	Saturation	Fault	Coast Stop	
8	System Fault	Fault	Coast Stop	
9	Undervoltage	Fault	Normal Stop	UV Warn
10	Input Phase	<i>Input Ph. Superv</i>	<i>Input Ph. Superv</i>	
11	Output Phase	<i>Phase Supv F</i>	<i>Phase Supv F</i>	
12	Brk Chopper Supr	Fault	Coast Stop	
13	Undertemp	Fault	Coast Stop	
14	Overtemp	Fault	Coast Stop	
15	Motor Stall	<i>Stall Protection</i>	<i>Stall Protection</i>	
16	Mot.Overtemp	<i>Therm Prot F</i>	<i>Therm Prot F</i>	Mtr OT Warn
17	MotorUnderld	<i>ULoad Protect F</i>	<i>ULoad Protect F</i>	
22/23	Chksum Flt	Fault	Coast Stop	
24	Changed data warning	Fault	Coast Stop	
25	Micro Watchdog	Fault	Coast Stop	
29	Thermistor	<i>ThermistorF.Resp</i>	<i>ThermistorF.Resp</i>	Therm Warn Act
31	IGBT Temp	Fault	Coast Stop	Over Temp Warn
32	Fan Control	Fault	Coast Stop	
37	Device Change	Fault	Coast Stop	
38	Device Added	Fault	Coast Stop	
39	Device Removed	Fault	Coast Stop	
40	Device Unknown	Fault	Coast Stop	
41	IGBT Temp	Fault	Coast Stop	
50	Anlg In Flt	Fault	Coast Stop	
51	Ext Fault	<i>Ext Flt Resp</i>	<i>Ext Flt Resp</i>	
52	Keypad Comm	Fault	Normal Stop	
53	FBCommunicat	<i>FBComm.FaultResp</i>	<i>FBComm.FaultResp</i>	
54	Slot Communic	<i>SPI Flt Resp</i>	<i>SPI Flt Resp</i>	
57	Identification	Warning	Coast Stop	
60	Com Watchdog	<i>WD Flt Response</i>	<i>WD Flt Response</i>	
61	User Fault 1	<i>User Flt1 Resp</i>	<i>User Flt1 Resp</i>	
62	User Fault 2	<i>User Flt2 Resp</i>	<i>User Flt2 Resp</i>	
63	User Fault 3	<i>User Flt3 Resp</i>	<i>User Flt3 Resp</i>	
64	User Fault 4	<i>User Flt4 Resp</i>	<i>User Flt4 Resp</i>	
65	Overspeed Flt	<i>Overspeed Resp</i>	<i>Overspeed Resp</i>	
66	SB Comm Fault	<i>SB Comm Flt Resp</i>	<i>SB Comm Flt Resp</i>	
70	Loc Stop Flt	Fault	Coast Stop	

10-7 SPECIFIC FAULT SETUP

10-7.1 User Faults

Parameters	Type	Default
<i>Ext Fault Inp</i>	BCFG	<i>Zero Bit</i>
<i>Ext Warn</i>	DPB	
<i>Ext Flt Resp</i>	E	2 = Fault
<i>User Flt 1</i>	BCFG	<i>Zero Bit</i>
<i>User Flt 2</i>	BCFG	<i>Zero Bit</i>
<i>User Flt 3</i>	BCFG	<i>Zero Bit</i>
<i>User Flt 4</i>	BCFG	<i>Zero Bit</i>
<i>User Flt1 Resp</i>	E	2 = Fault
<i>User Flt2 Resp</i>	E	2 = Fault
<i>User Flt3 Resp</i>	E	2 = Fault
<i>User Flt4 Resp</i>	E	2 = Fault

Ext Fault Inp and the four user faults can be configured to any bit ID to trigger a drive fault. The drive will fault if the response is set = 2 Fault and the input goes high.

When *Ext Flt Resp* is set to warning *Ext Warn* will go high when *Ext Fault Inp* goes high.

10-7.2 Motor Over Temp

Parameters	Type	Default
<i>MotAmbTempFactor</i>	CAL	0
<i>Mot Therm 0 spd</i>	CAL	40.0
<i>Mtr Therm TC</i>	CAL	10
<i>Motor Duty Cycle</i>	CAL	100
<i>Motor Current</i>	APB	
<i>Motor Speed</i>	APB	
<i>MtrCalc Temp</i>	APB	
<i>Therm Prot F</i>	E	2 = Fault

A motor thermal model is built into the drive to determine if the AC motor is getting hot. Settings for this model are:

- *MotAmbTemFactor* = Percentage to adjust the percentage of the ambient temperature. 0 = nominal.
- *Mot Therm 0 Spd* = Motor cooling ability at zero speed.
- *Mtr Therm TC* = Motor thermal time constant in minutes.
- *Motor Duty Cycle* = Motor rated duty cycle in percentage.

With the above setting and the motor current and speed the model calculates the temperature as *MtrCalc Temp* as a percentage of maximum temperature.

10-7.3 Motor Stall

Parameters	Type	Default
<i>Stall Cur Lim</i>	CAL	480
<i>Motor Current</i>	APB	
<i>Stall Freq</i>	CAL	25.00 Hz
<i>Motor Speed</i>	APB	
<i>Stall Time</i>	CAL	15.00 s
<i>Stall Protection</i>	E	0 = No Action

Motor stall fault will occur if the motor current Exceeds *Stall Cur Lim* and the motor speed is below *Stall Freq* for *Stall Time* amount of seconds and is enabled by *Stall Protection*.

10-7.4 Thermistor

The drive has a thermistor fault available which is set by digital configuration point *Thermistor*

10-7.5 Under Load

Parameters	Type	Default
<i>Under Ld Trq Nom</i>	CAL	50.0 %
<i>Under Ld Trq 0</i>	CAL	10.0%
<i>Motor Speed</i>	APB	
<i>Motor Torque</i>	APB	
<i>Under Ld Stat T</i>	CAL	20.00 sec
<i>ULoad Protect F</i>	E	0 = No Action

The under load torque limit changes by speed. At zero speed the limit is *Under Ld Trq 0*. The limit changes linearly to nominal speed where the limit is set by *Under Ld Trq Nom*. If the torque falls below this limit for *Under Ld Stat T* seconds and its enable by *ULoad Protect F* then the drive will fault on Under Load fault

SECTION XI

QUICK STARTUP

The drive has two functions to help the user get started. The first is the startup wizard, which will assist in setup of the most basic motor parameters. The second is the identification routine, which will find the motor characteristics.

11-1 STARTUP WIZARD

The startup wizard can be accessed via the keypad under System Menu/Security. Setting this to **Yes** will enable the wizard on the next powerup of the drive.

The following parameters are presented for entry within the startup wizard:

Parameter	Default	Description
Language	English	Changes certain parameter names
Application	Spd/Ten	Application program
Min Frequency	0 Hz	Set to the minimum running motor frequency
Freq Max	60 Hz	Set to maximum motor frequency
Accel Time 1	10.0 s	Time to accelerate to nominal motor speed
Decel Time 1	10.0 s	Time to stop from, nominal motor speed
Motor Nom Voltg	460 V	Motor nominal voltage
Motor Nom Freq	60 Hz	Motor base running frequency
Motor Nom Speed	1750 rpm	Motor base running speed in RPM
Motor Nom Currnt	Varies by drive size	Motor 100% running current
Motor Cos Phi	0.85	Power factor value of drive

After completing the entry, the option is given to repeat the wizard in case a variable was missed. After accepting the wizard, it will be disabled.

11-2 IDENTIFICATION

The Motor Identification program is used to scale motor parameters that are not listed on the nameplate. The parameters listed in the startup wizard must be entered.

The Identification parameter (*Self Tune Motor*) is located in the parameters\motor menu of the drive. Three options are available.

- 0 = No Action
- 1 = ID No Run
- 2 = ID With Run

After selecting the action desired, the user has 20 seconds to activate a drive Run before the parameter switches back to 0 = No Action.

If possible, perform ID With Run with no load connected to the motor.

At any time during the Identification process, the stop button can be pressed to abort.

After identification is complete, the drive will fault on *Ident Warn*, and after 20 seconds, the *Self Tune Motor* parameter will go back to 0 = No Action. .

The motor control mode determines what parameters are adjusted.

- *Self Tune Motor* = ID No Run
 - a) For open loop motor control:
 - U/f curve, stator resistance, and torque boost are found
 - b) For close loop motor control:
 - Magnetizing current
 - Rotor time constant
- *Self Tune Motor* = ID With Run
 - a) For open loop motor control
 - U/f curve, stator resistance, and torque boost are found
 - b) For close loop motor control
 - Magnetizing current
 - Rotor time constant
 - 15 point flux linearization curve

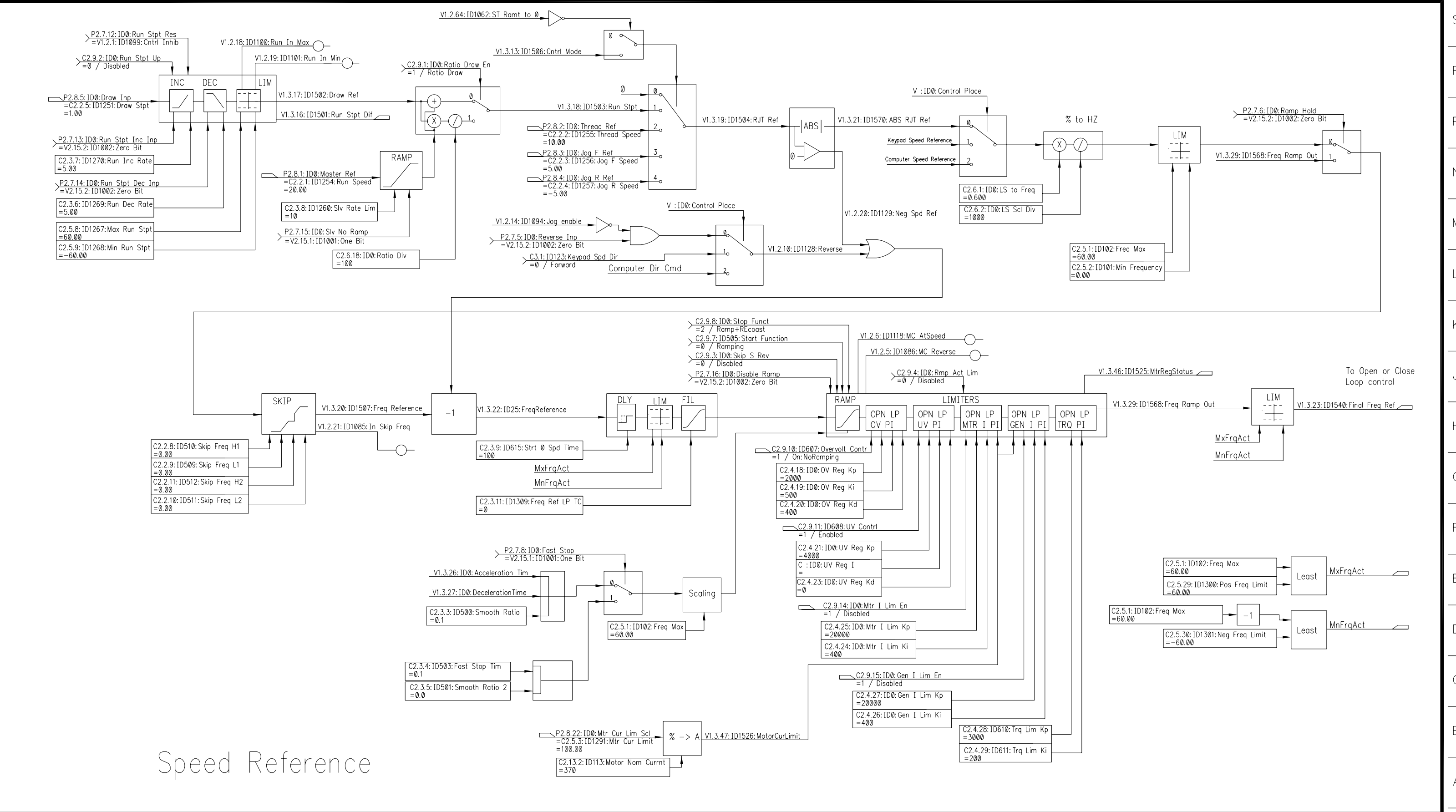
During the self tuning of the motor, a couple of parameters can be monitored with ADDaptACC to see the progress of the tuning. These are firmware parameters not found in the parameter list.

- Identification parameter:
 - B0= Programming U/f curve
 - B1 = Tr/Lm identification at a stand still
 - B2 = Magnetizing current testing
 - B3 = Saturation curve testing
 - B4 = Encoder zero position test
 - B5 = Magnetizing current Default
 - B14 = Phase Check
 - B15 = Synch check
- *Mtr Cur ID* = Value found from self tune
- *Mk Flux Time* = Time constant found during self tune
- *Mk Flux Voltage, Mk Flux V Hw Dt* = Flux voltage found during self tune

- IdentOptions:
 - B0= Enable U/f curve tuning
 - B1 = Enable close loop tuning
 - B2 = Enable encoder direction check
 - B3 = Automatic magnetizing current check with motor change
- IdentRSVoltageDrop = Voltage drop found during self tune.
- *Pwr IU Offset* = Offset hardware measurement.
- *Pwr IV Offset* = Offset hardware measurement.
- *Pwr IW Offset* = Offset hardware measurement.

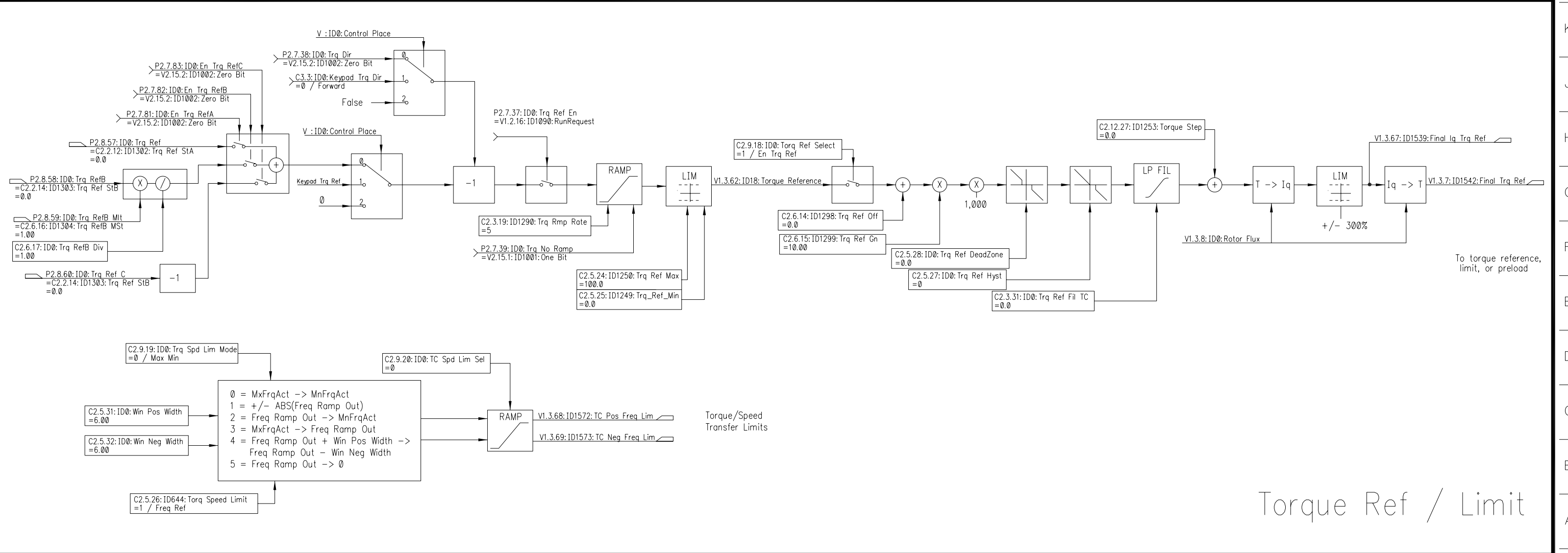
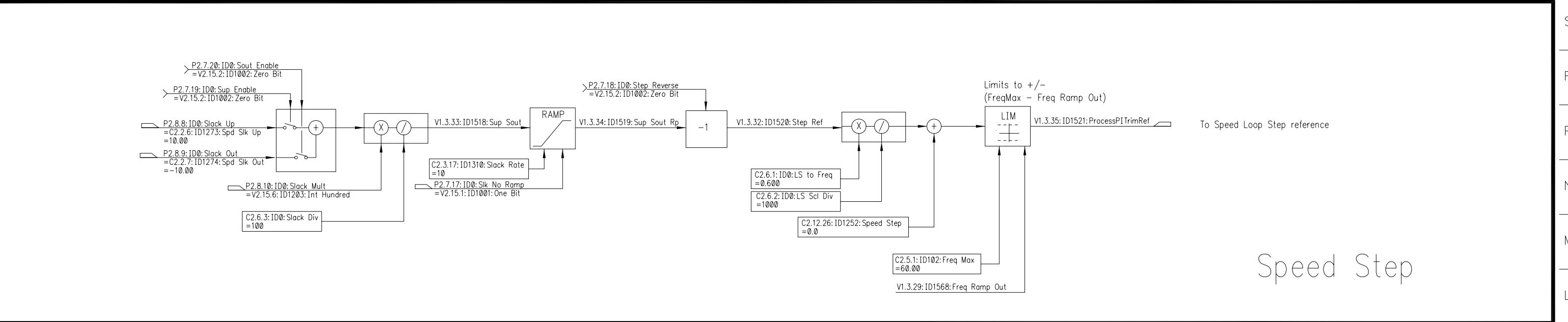
APPENDIX A

SOFTWARE BLOCK DIAGRAMS

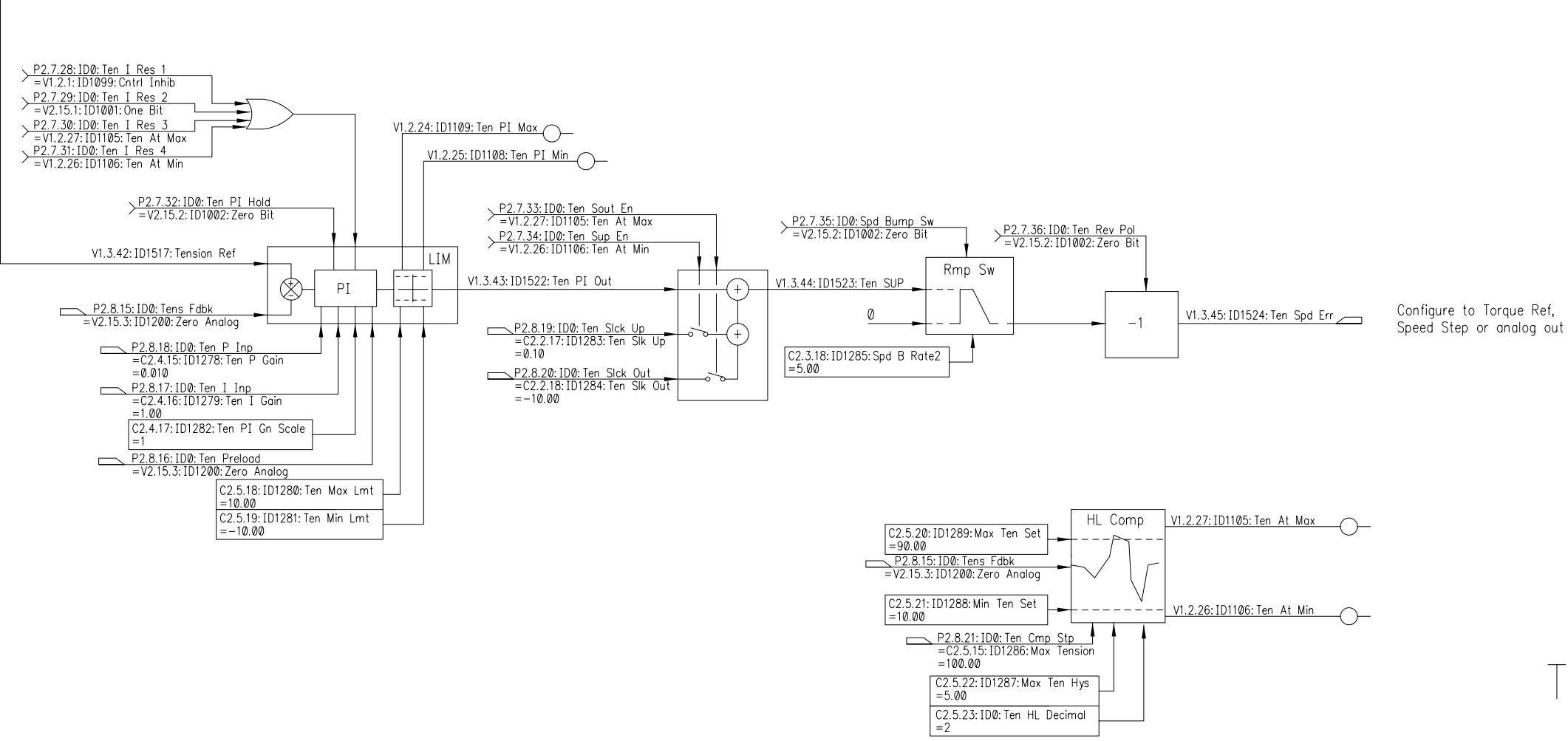
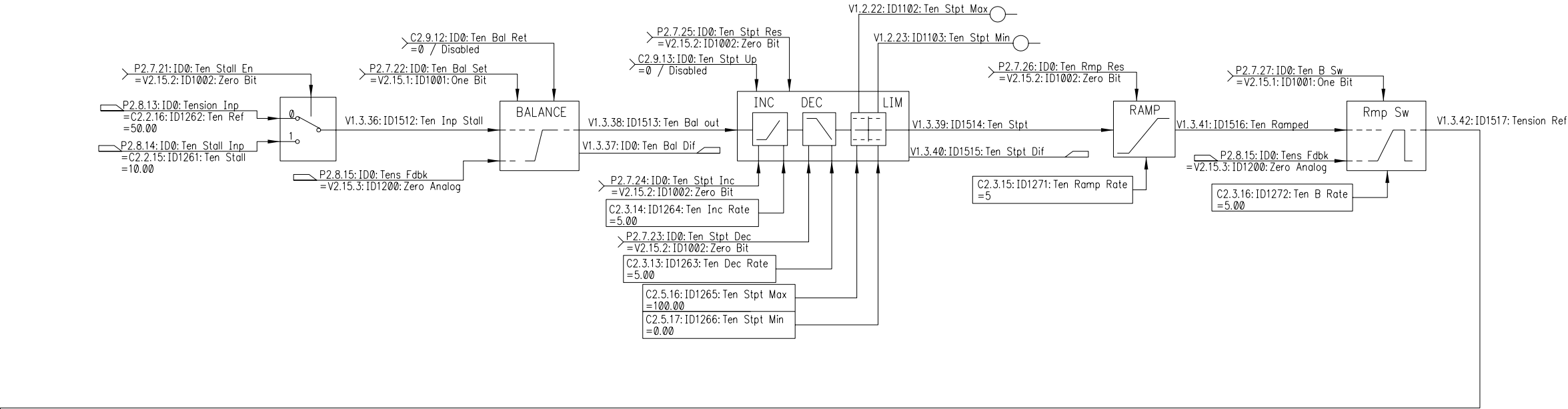


THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF AVTRON AND MAY NOT BE DISCLOSED TO OTHERS OR USED FOR MANUFACTURING PURPOSES WITHOUT THE WRITTEN CONSENT OF AVTRON	ACCe1500	695117.V10		DRAWN STEFANCIK	DATE 2/12/10	* A AVTRON 7900 E. PLEASANT VALLEY RD. INDEPENDENCE, OH 44131 - 5529	SECTION NO. DEFAULTS			
				CHECKED						
				ENG. APP'D						
	MODEL	USED ON	NEXT ASSEMBLY	APP'D PROD.				CAGE NO. 01014	SIZE B	DWG. NO. 511710a1

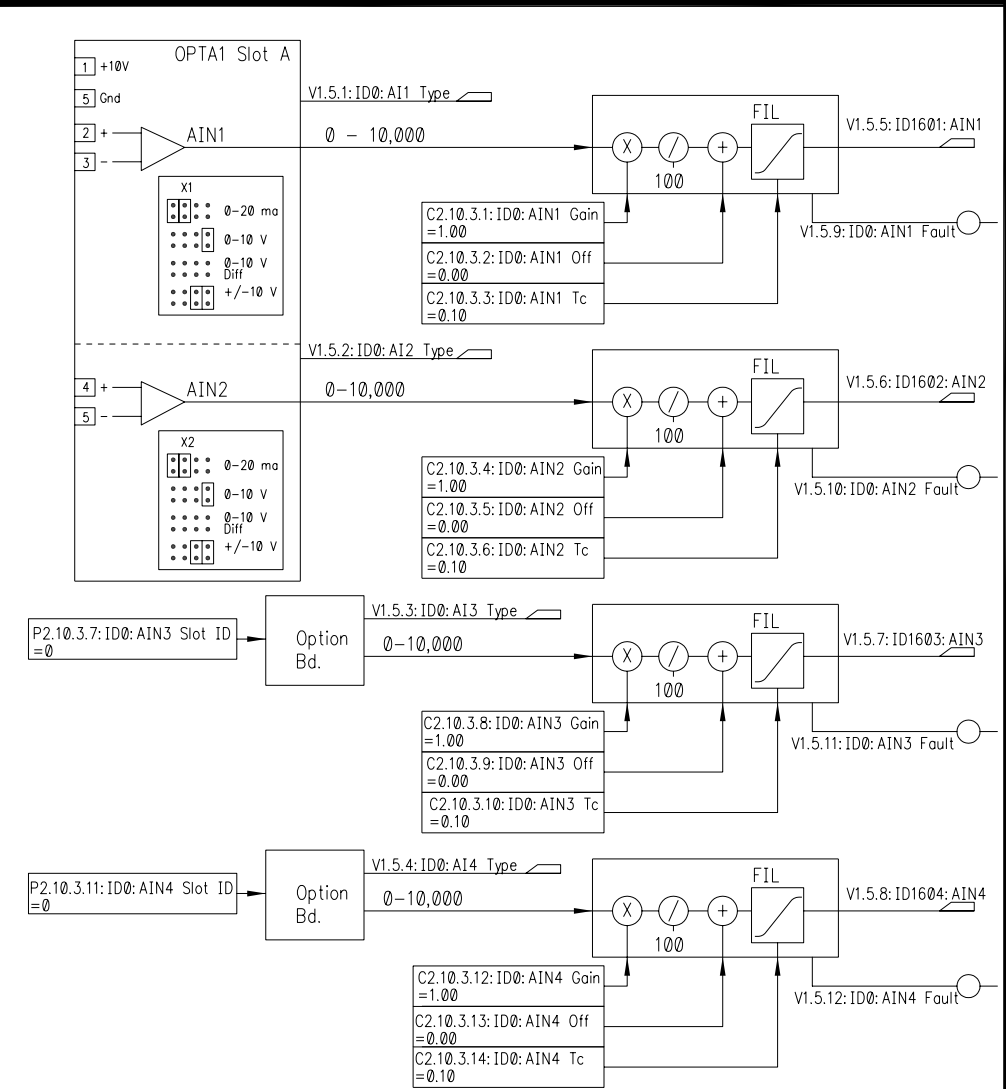
S
—
R
—
P
—
N
—
M
—
L
—
K
—
J
—
H
—
G
—
F
—
E
—
D
—
C
—
B
—
A
—



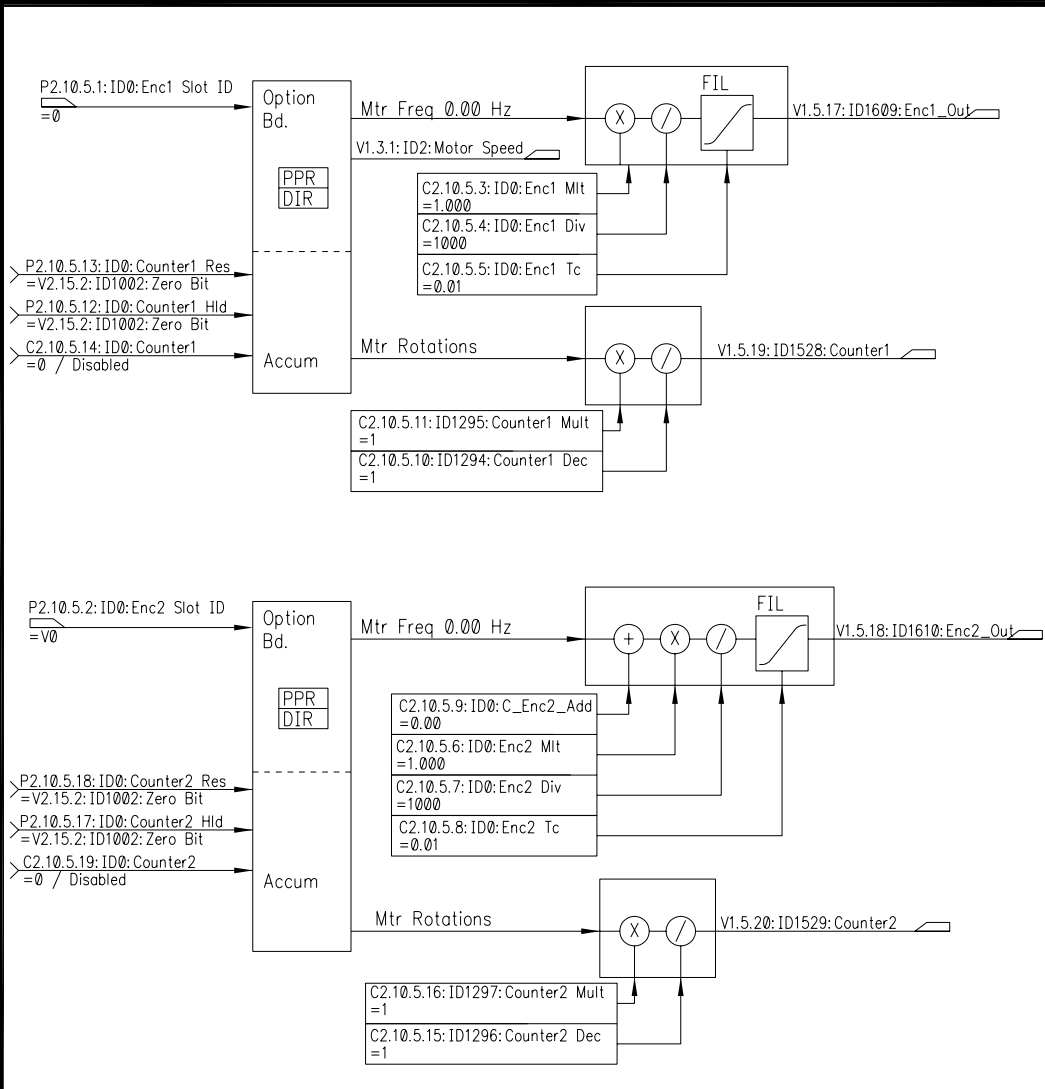
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF AVTRON AND MAY NOT BE DISCLOSED TO OTHERS OR USED FOR MANUFACTURING PURPOSES WITHOUT THE WRITTEN CONSENT OF AVTRON	ACCe1500	695117.V10		DRAWN STEFANCIK	DATE 2/12/10	* A VTRON 7900 E. PLEASANT VALLEY RD. INDEPENDENCE, OH 44131 – 5529	SECTION NO. DEFAULTS			
				CHECKED						
				ENG. APP'D						
	MODEL	USED ON	NEXT ASSEMBLY	APP'D PROD.				CAGE NO. 01014	SIZE B	DWG. NO. 511710a2



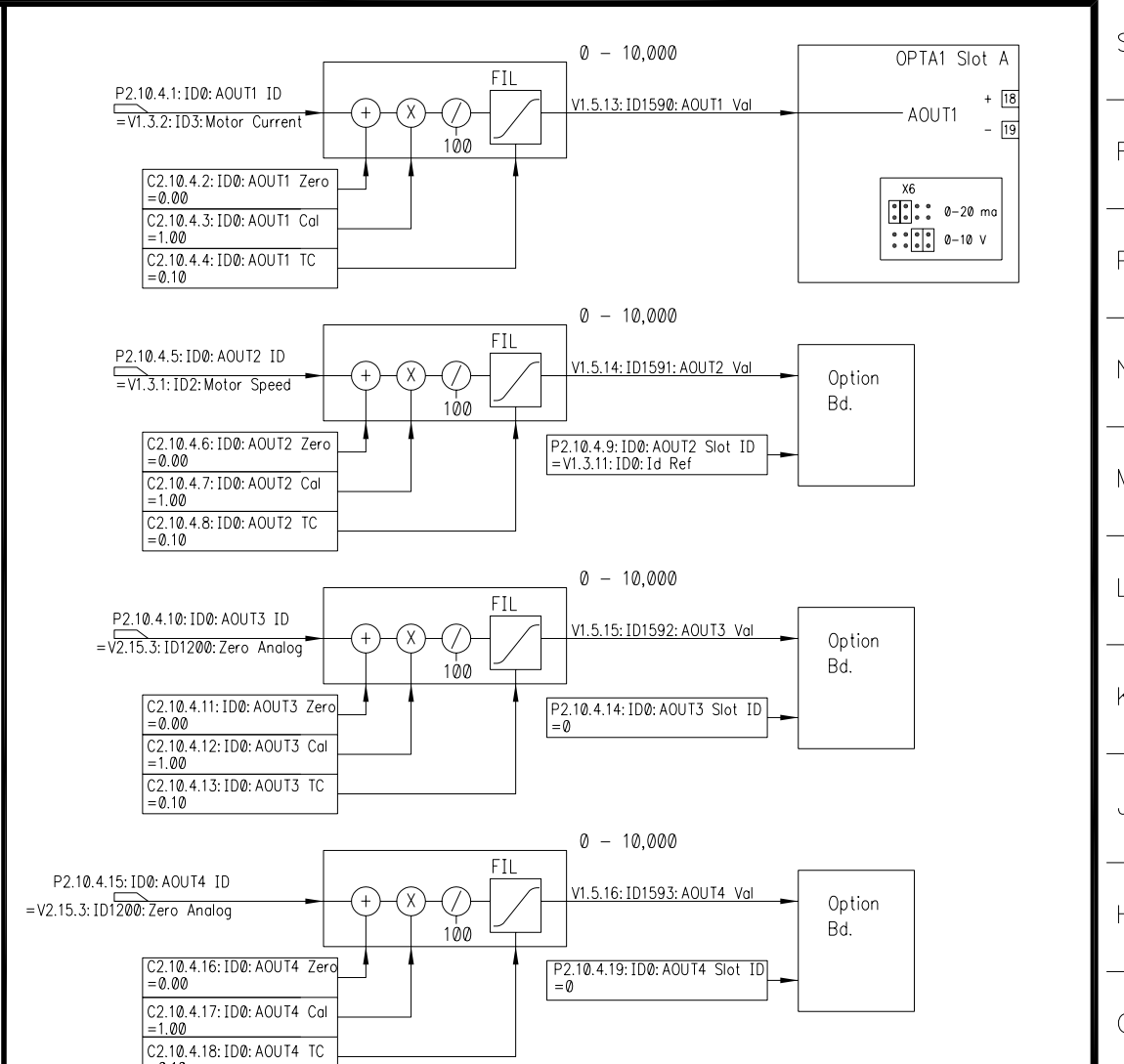
Tension Loop



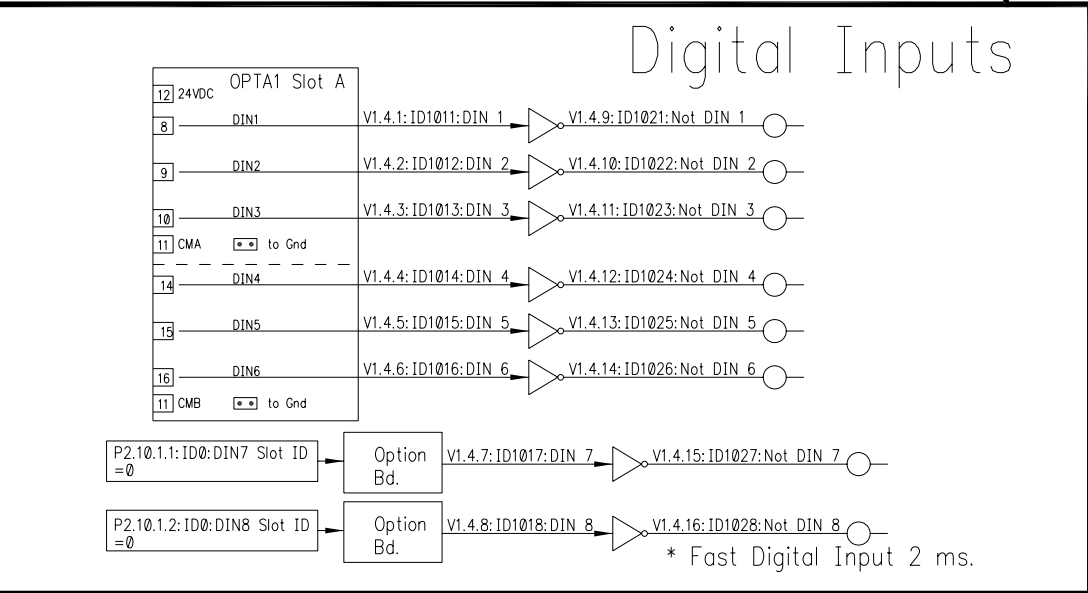
Analog Inputs



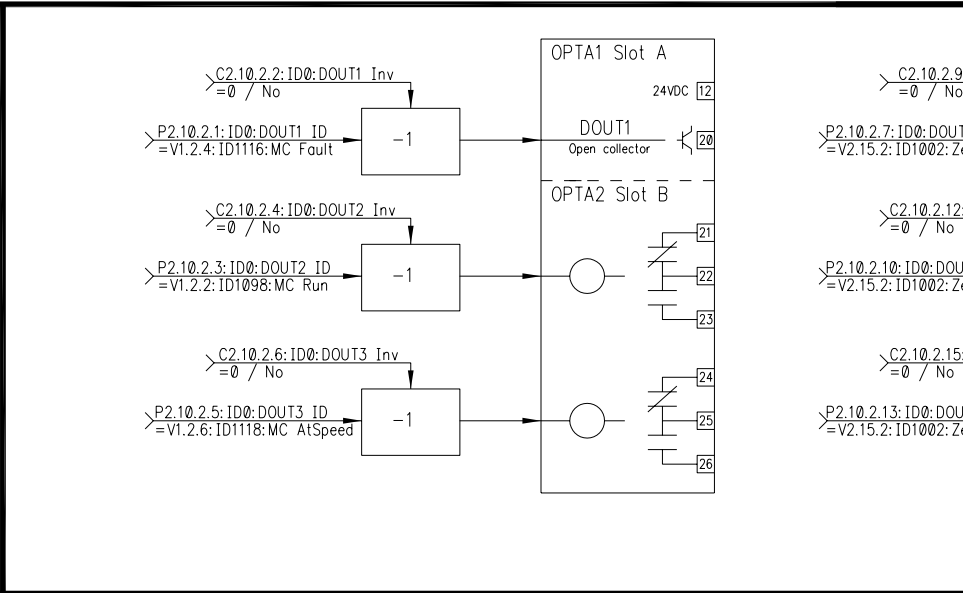
Encoder Inputs



Analog Outputs

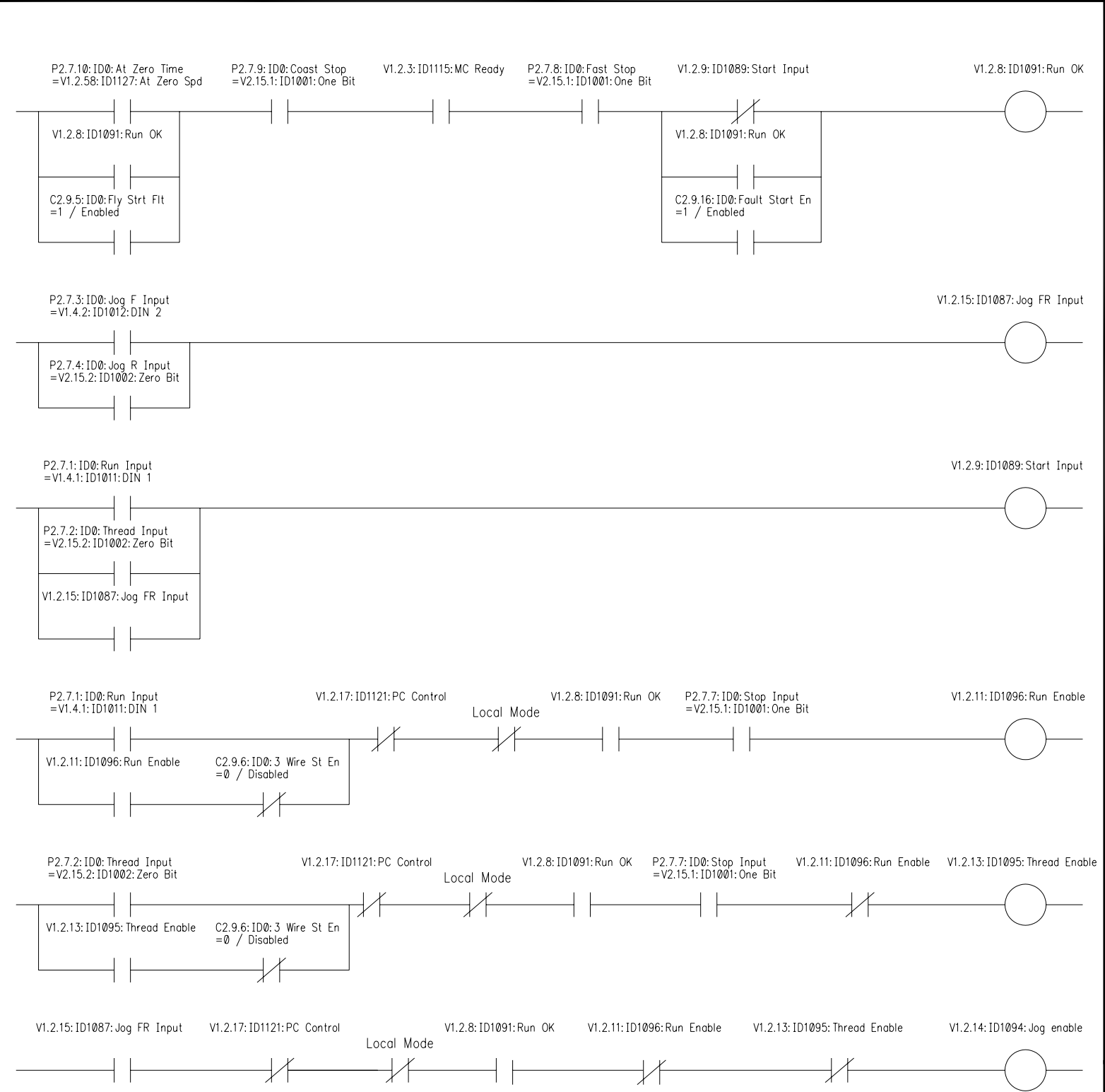


Digital Inputs

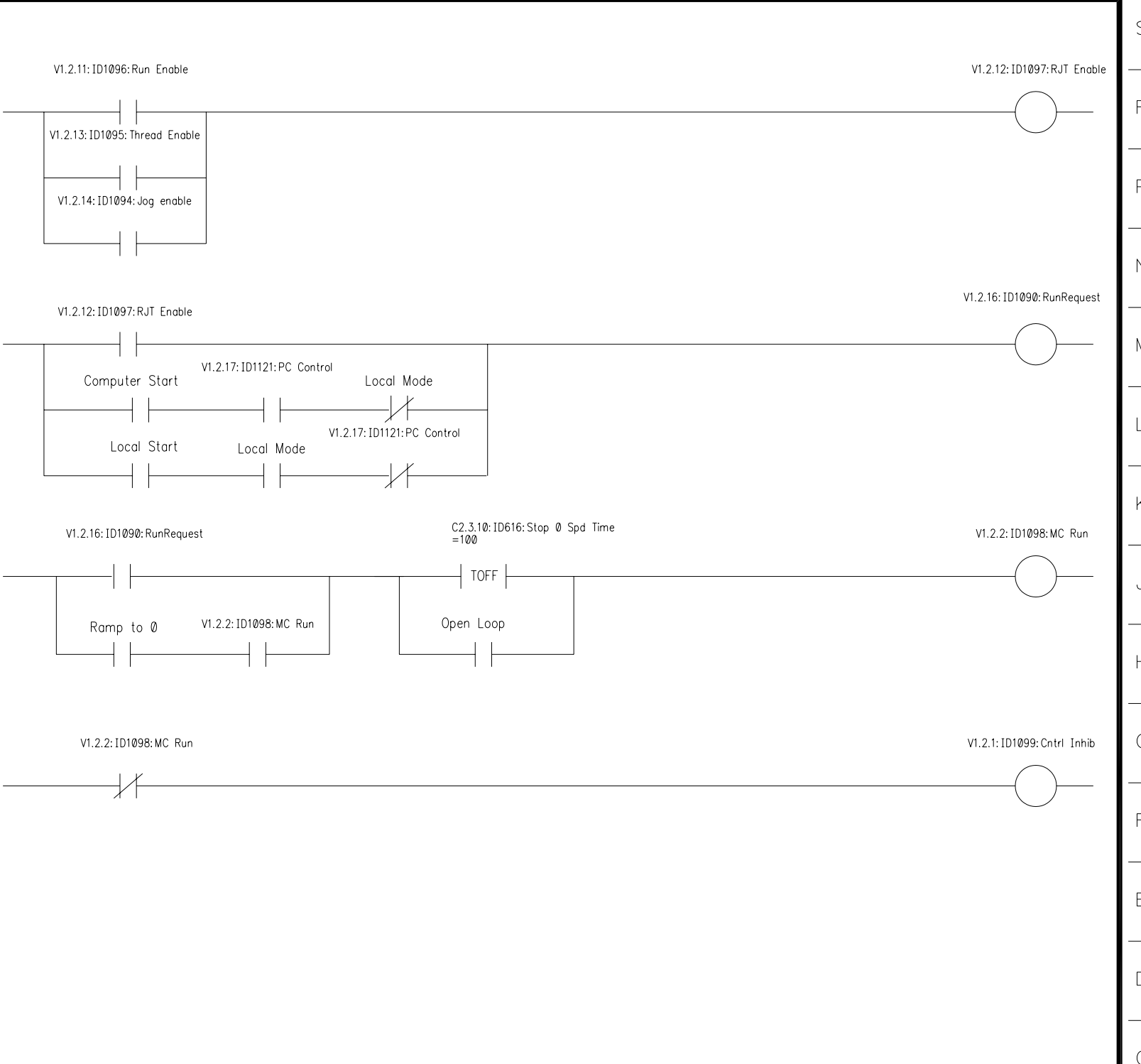


Digital Outputs

* Fast Digital output 2 ms.



Drive Logic



- V2.15.3:ID1200:Zero Analog

V2.15.4:ID1201:One Analog

V2.15.5:ID1202:Int Ten

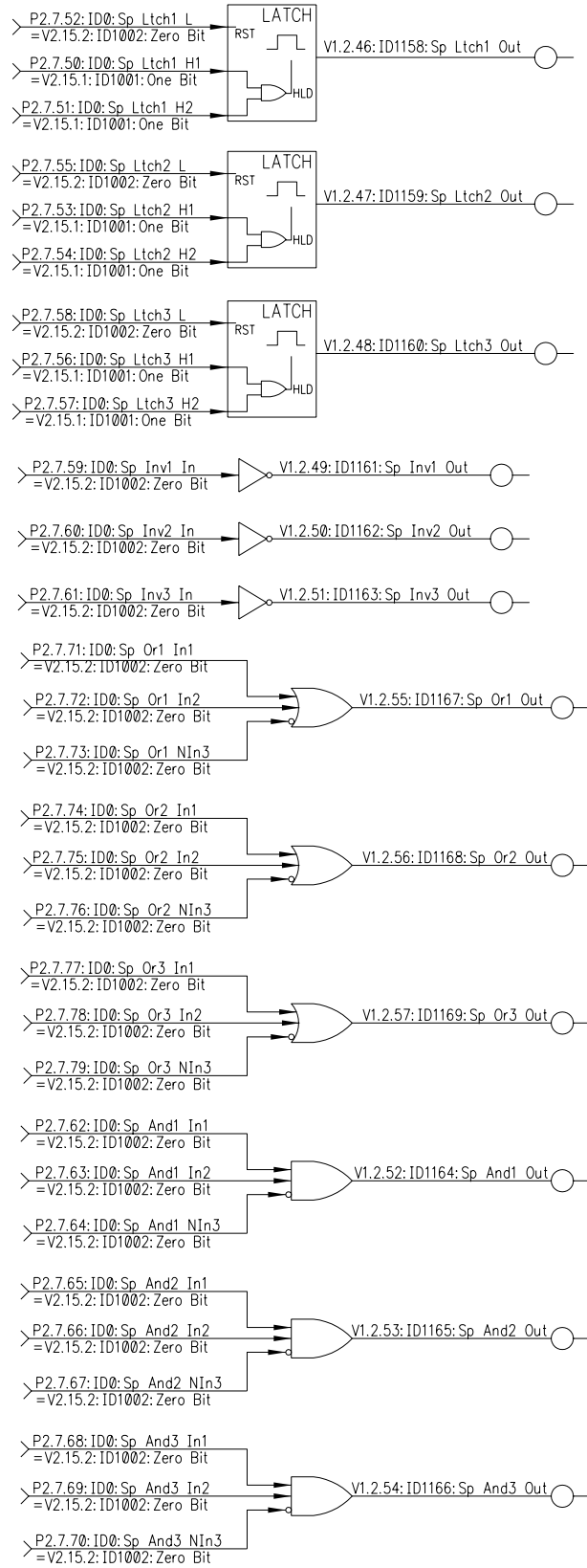
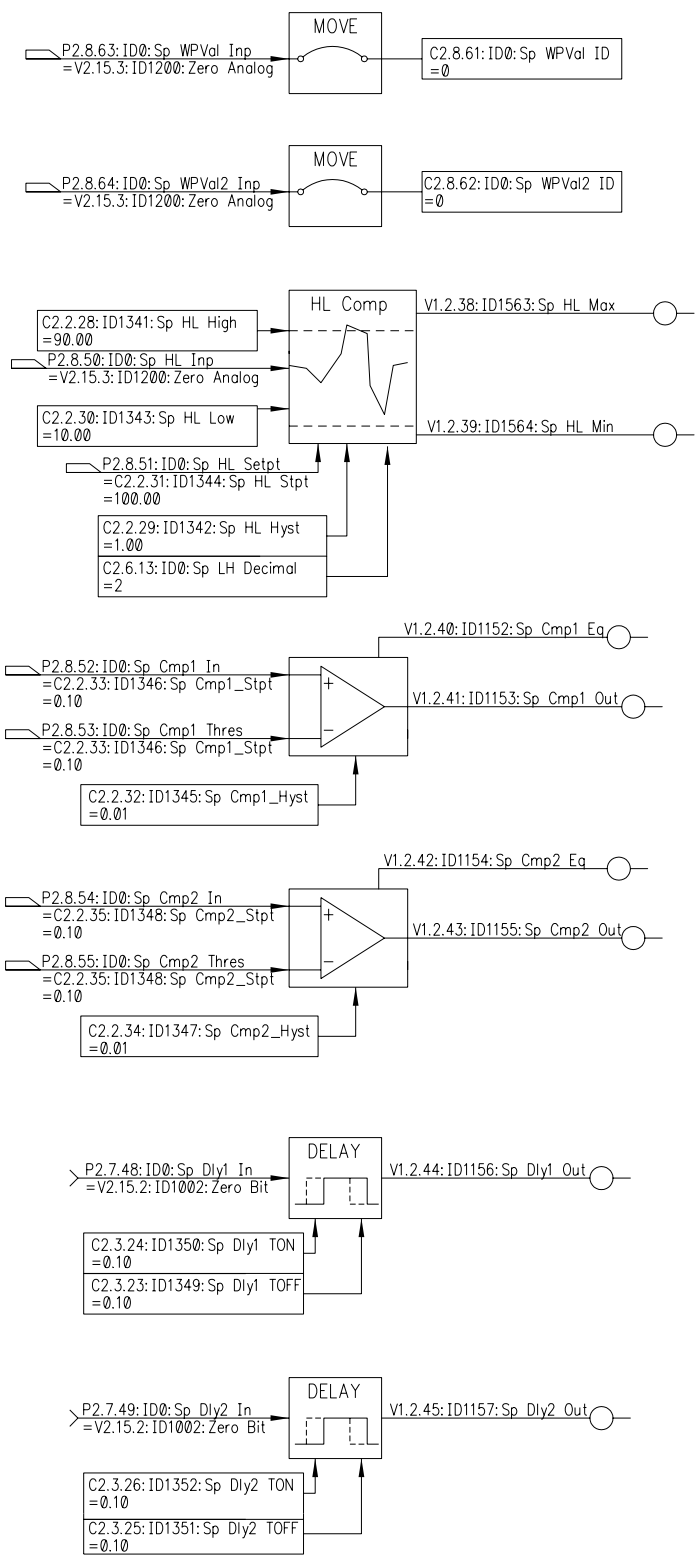
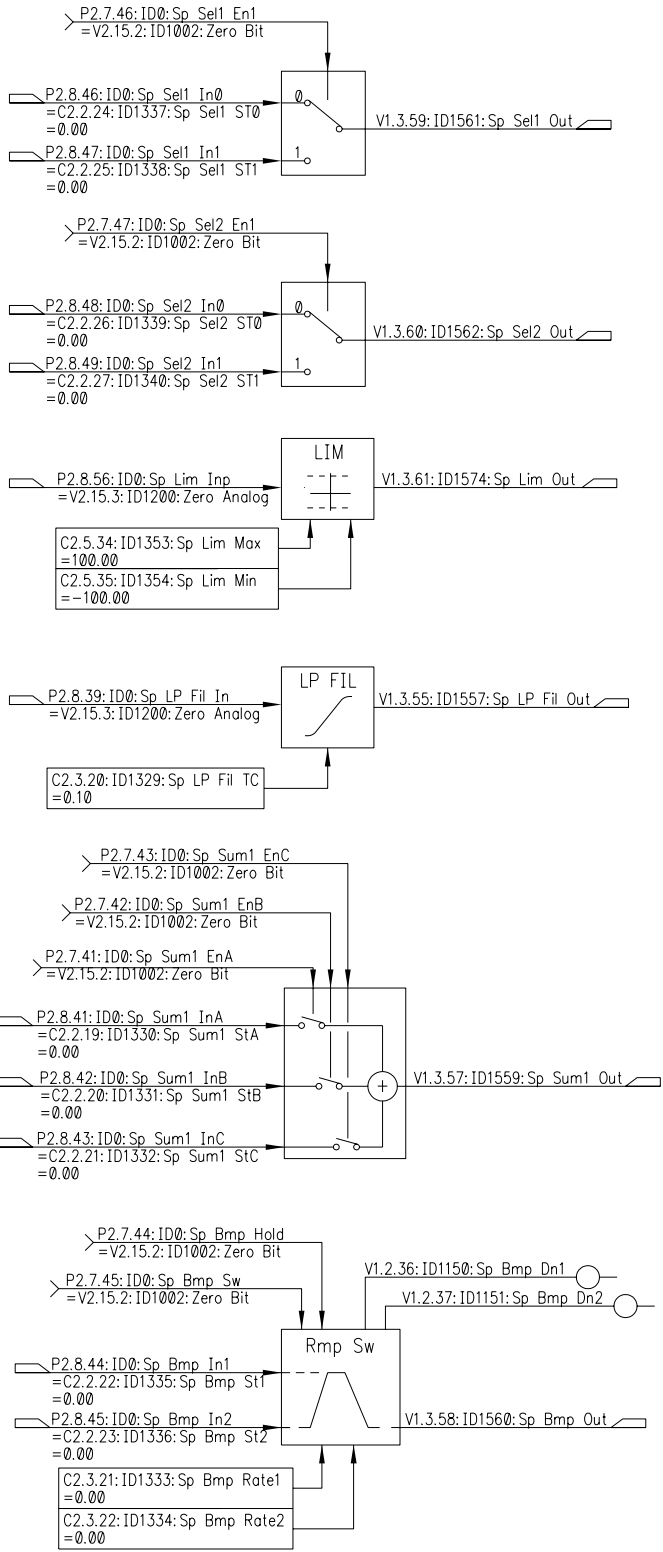
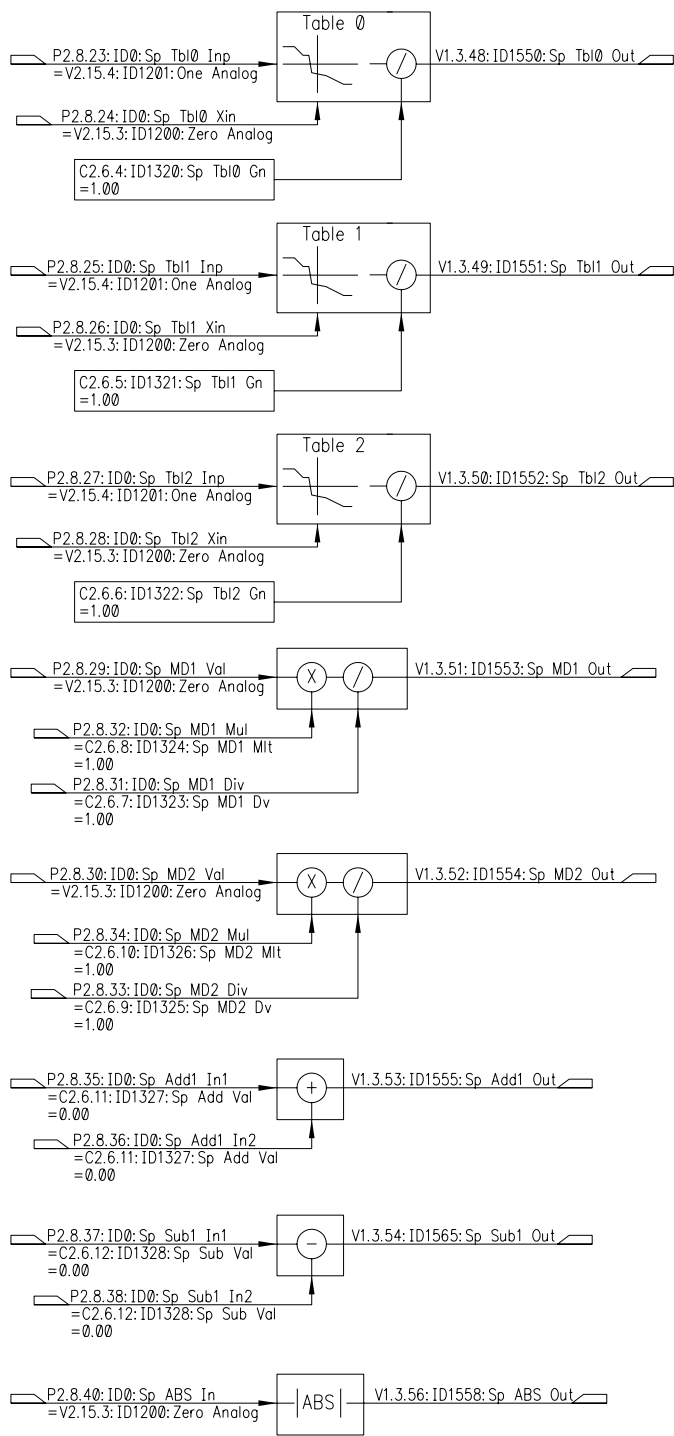
V2.15.6:ID1203:Int Hundred

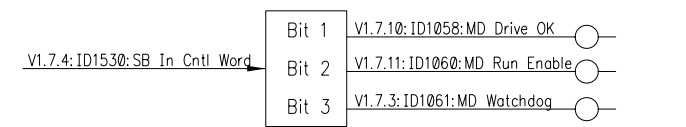
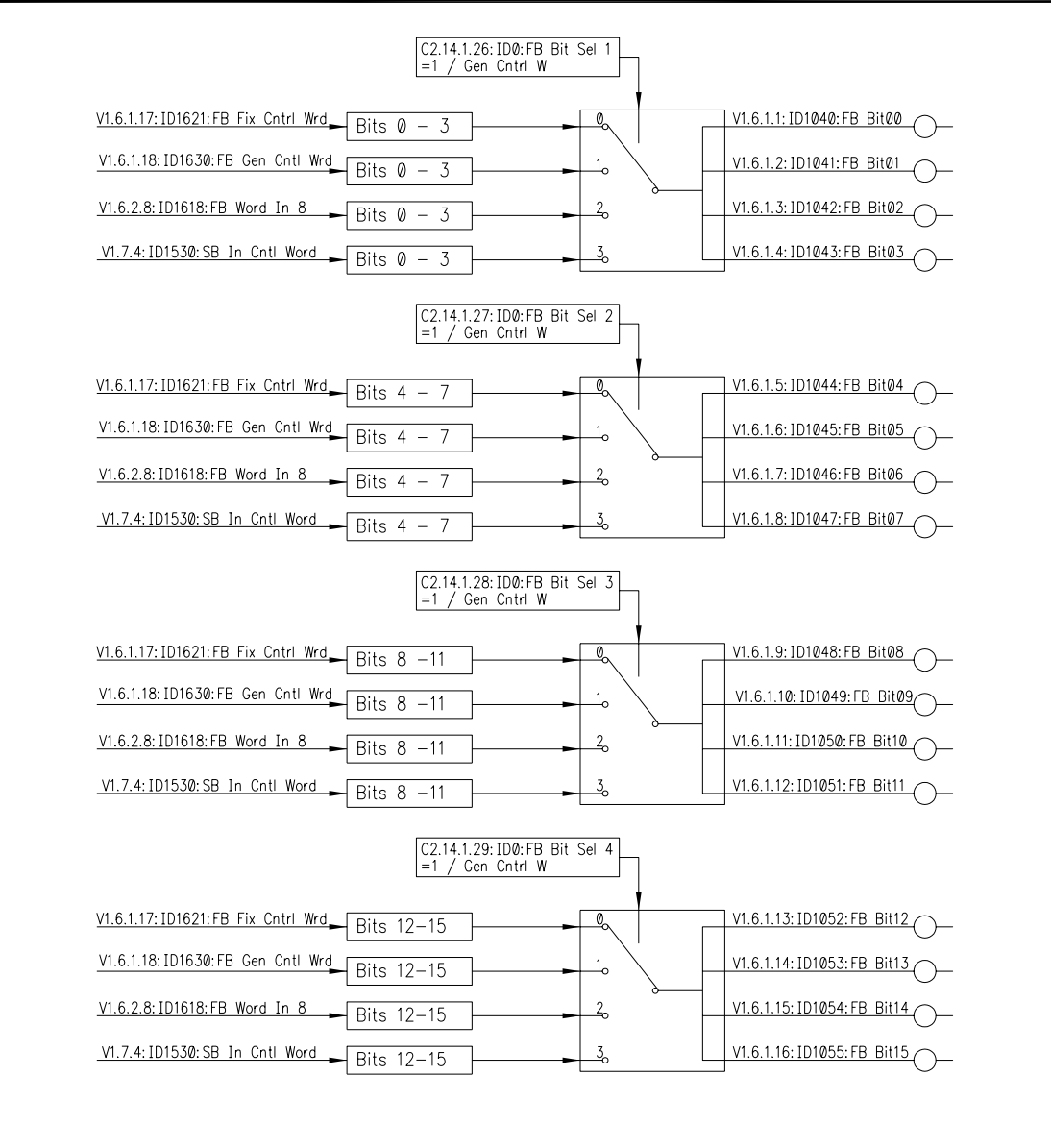
V2.15.7:ID1204:Int Thousand
- V2.15.1:ID1001:One Bit

V2.15.2:ID1002:Zero Bit

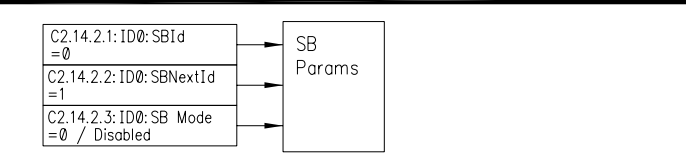
Constants

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF AVTRON AND MAY NOT BE DISCLOSED TO OTHERS OR USED FOR MANUFACTURING PURPOSES WITHOUT THE WRITTEN CONSENT OF AVTRON	ACCeI500		695117.V10		DRAWN STEFANCIK	DATE 2/12/10	* A VTRON 7900 E. PLEASANT VALLEY RD. INDEPENDENCE, OH 44131 – 5529	SECTION NO. DEFAULTS			
					CHECKED						
					ENG. APP'D						
	MODEL		USED ON	NEXT ASSEMBLY	APP'D PROD.			CAGE NO. 01014	SIZE B	DWG. NO. 511710a5	FIGURE NO. A-5



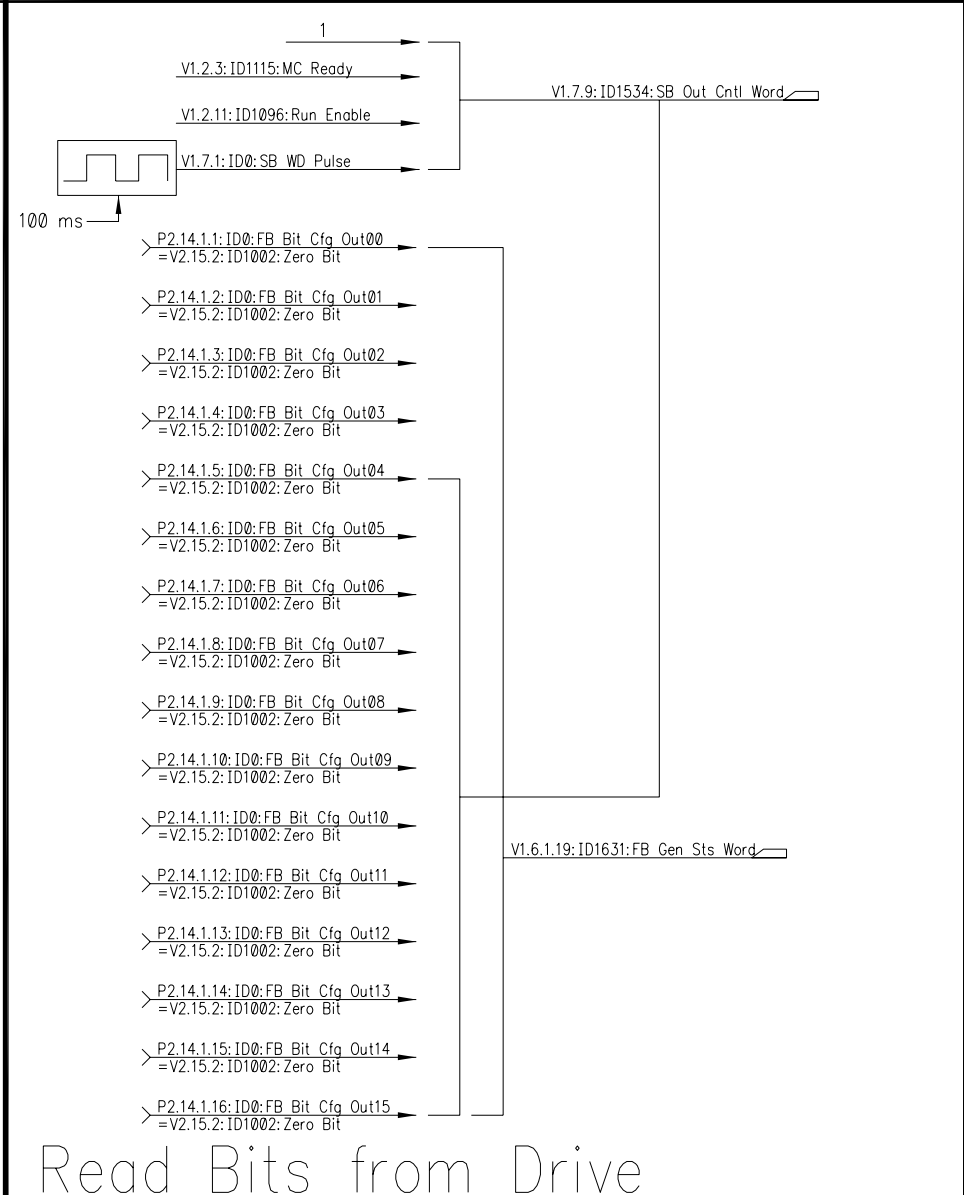


Write Bits to Drive

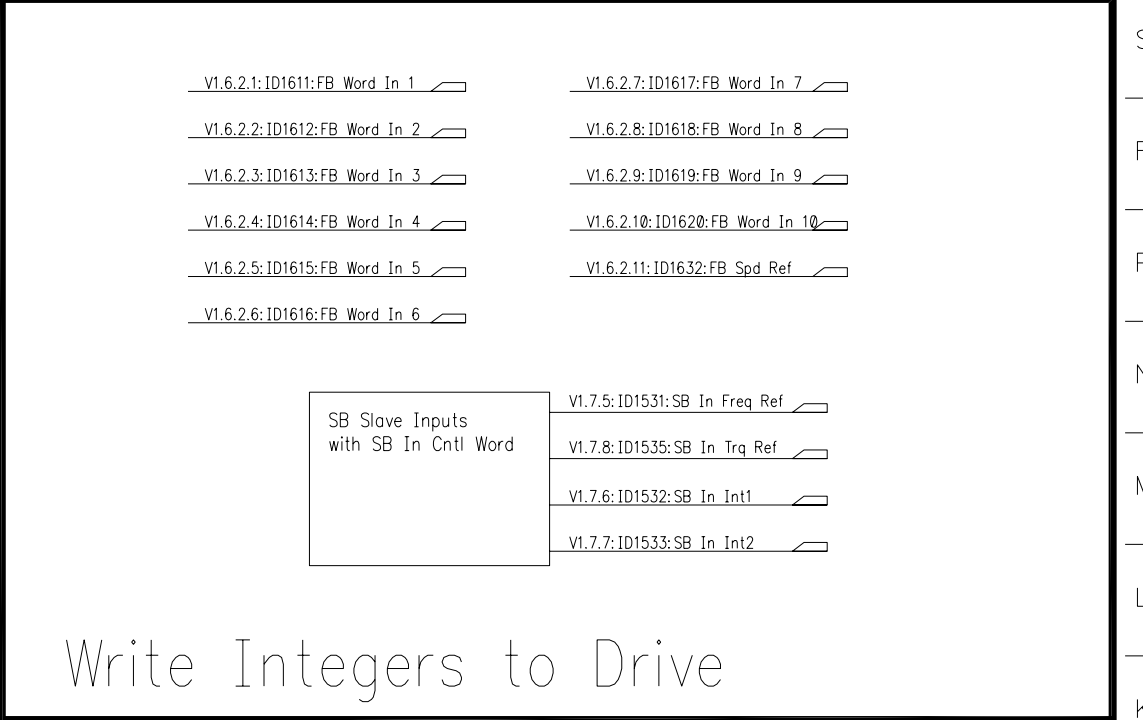
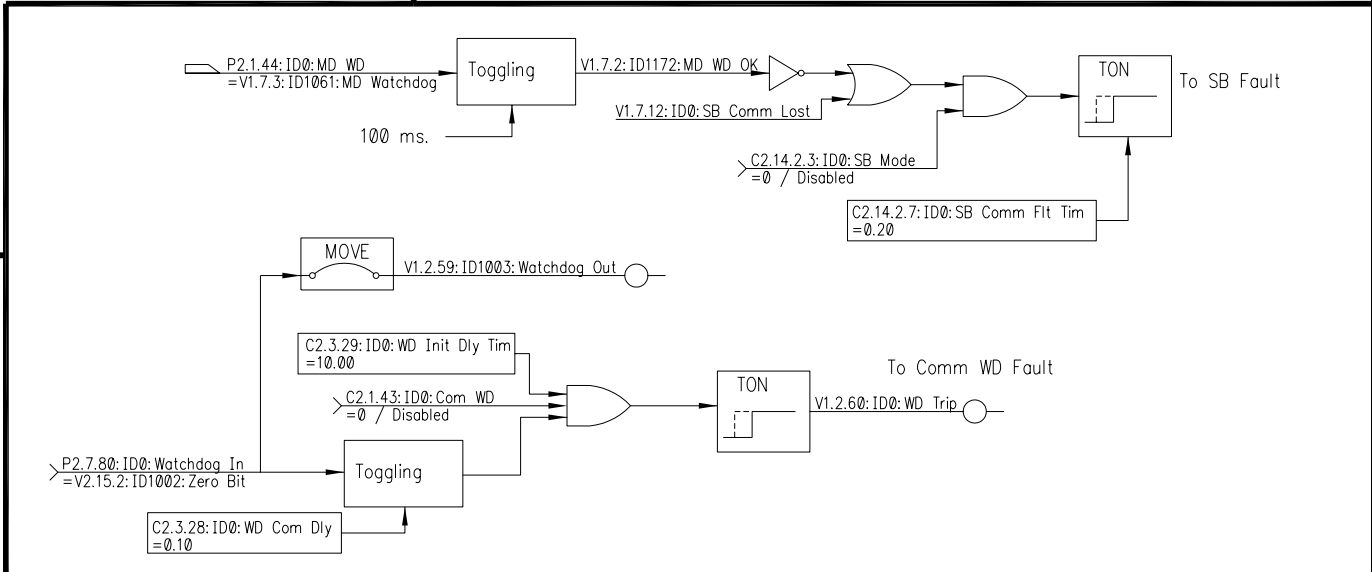


SB IDs

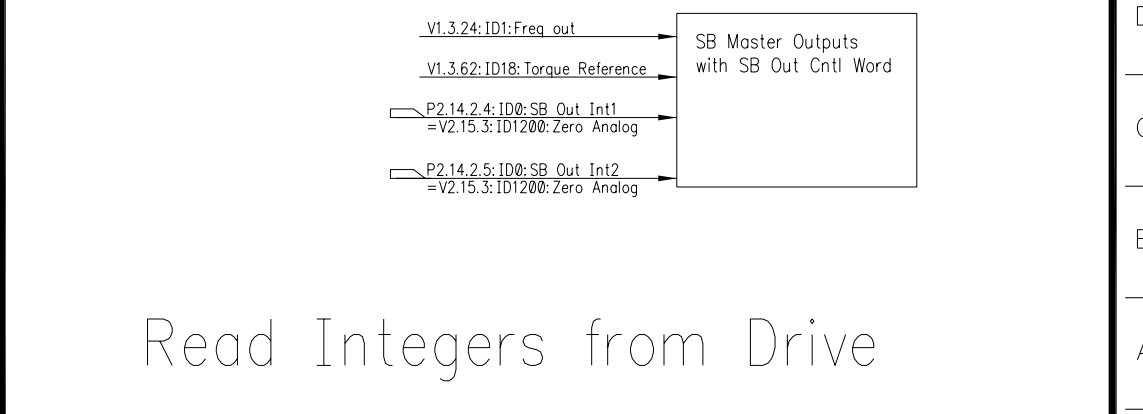
THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF AVTRON AND MAY NOT BE DISCLOSED TO OTHERS OR USED FOR MANUFACTURING PURPOSES WITHOUT THE WRITTEN CONSENT OF AVTRON	ACCeI500	695117.V10		DRAWN STEFANCIK	DATE 2/12/10	* AVTRON 7900 E. PLEASANT VALLEY RD. INDEPENDENCE, OH 44131 - 5529	SECTION NO. DEFAULTS			
				CHECKED						
				ENG. APP'D						
	MODEL	USED ON	NEXT ASSEMBLY	APP'D PROD.				CAGE NO. 01014	SIZE B	DWG. NO. 511710a7



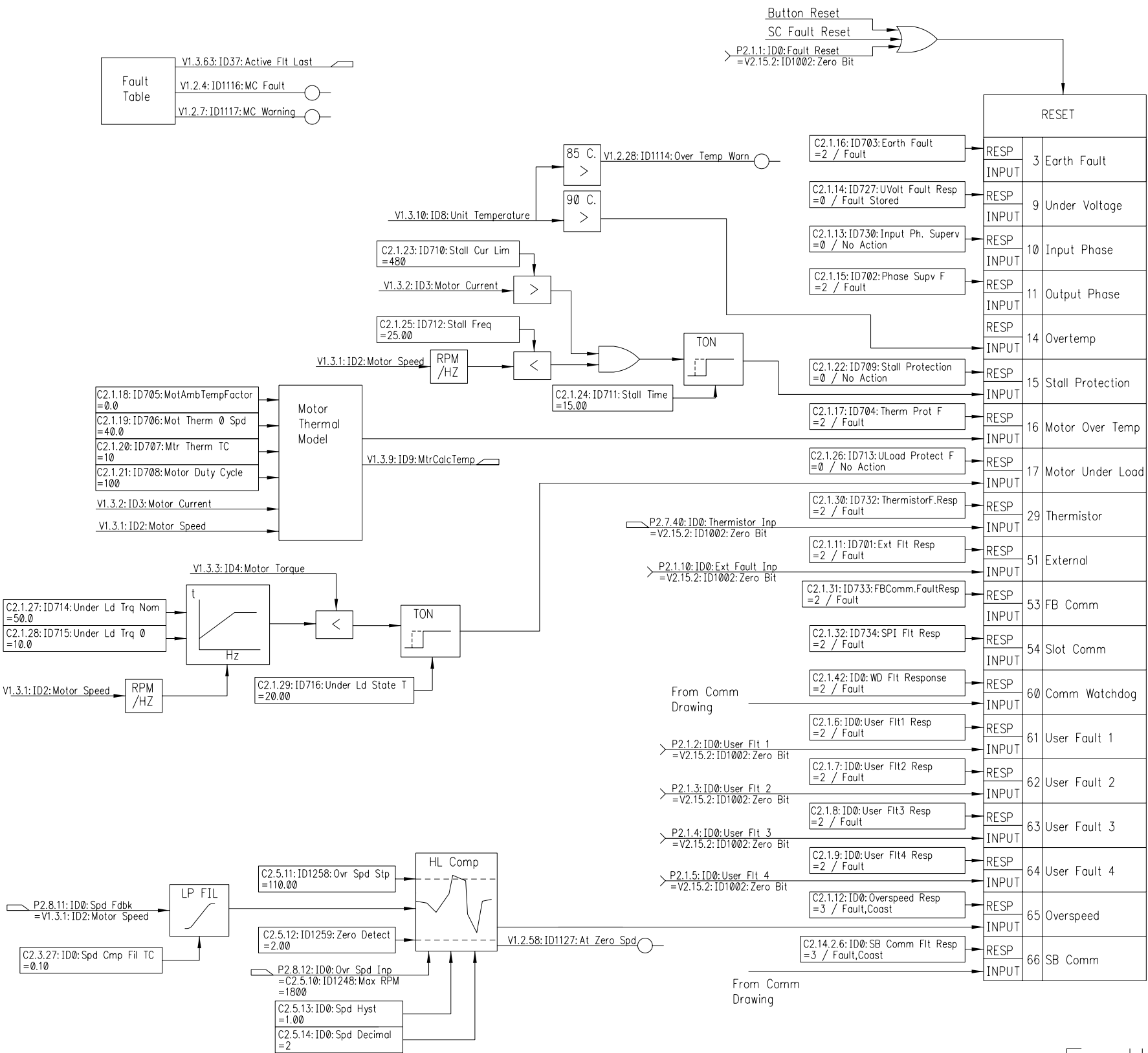
Read Bits from Drive



Write Integers to Drive



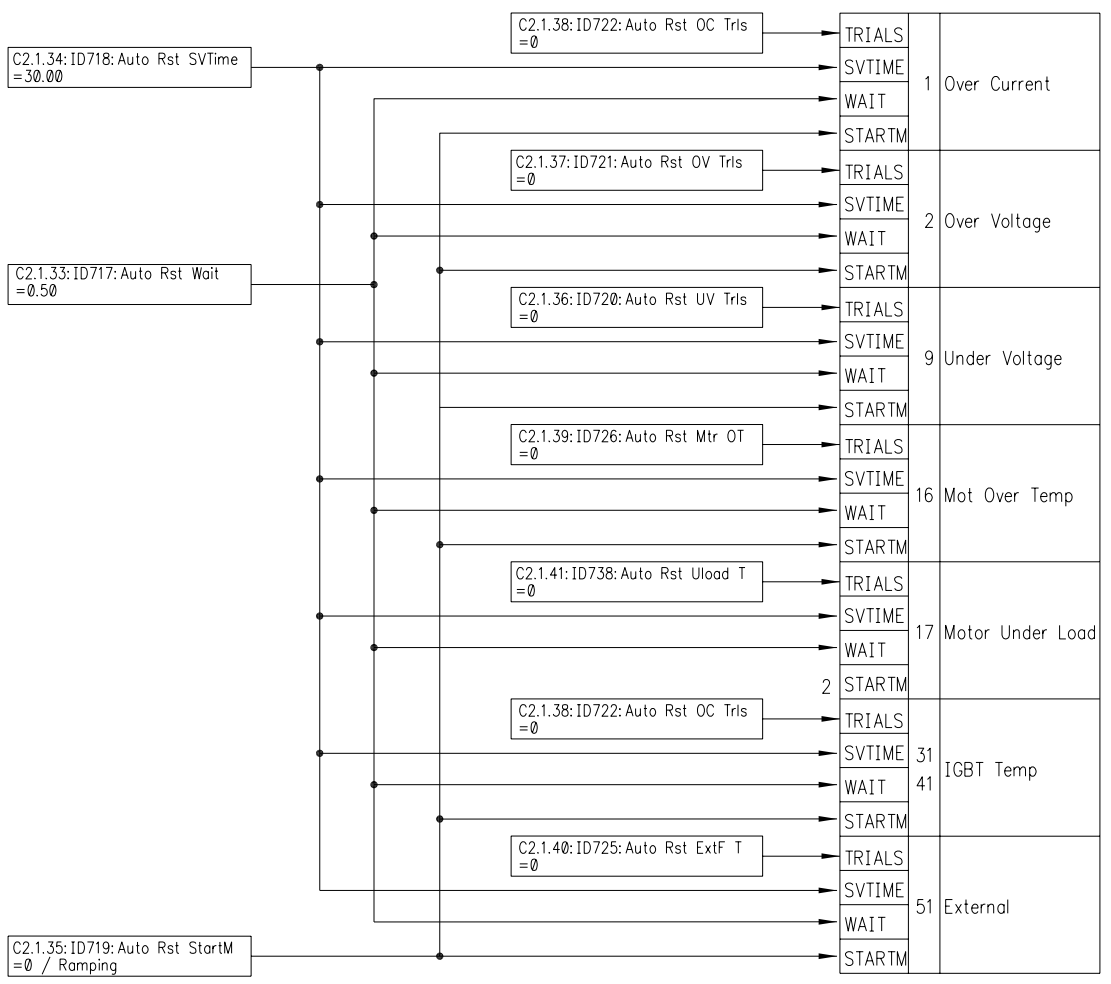
Read Integers from Drive



Faults

1	Over Current	V1.2.31:ID0:OC Warn
2	Over Voltage	V1.2.32:ID0:OV Warn
9	Under Voltage	V1.2.30:ID0:UV Warn
16	Motor Over Temp	V1.2.34:ID0:Mtr_OT Warn
29	Thermistor	V1.2.29:ID1120:Therm Warn Act
51	External	V1.2.33:ID0:Ext Warn
57	Identification	V1.2.35:ID0:Ident Warn

Warnings



Auto Reset

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF AVTRON AND MAY NOT BE DISCLOSED TO OTHERS OR USED FOR MANUFACTURING PURPOSES WITHOUT THE WRITTEN CONSENT OF AVTRON

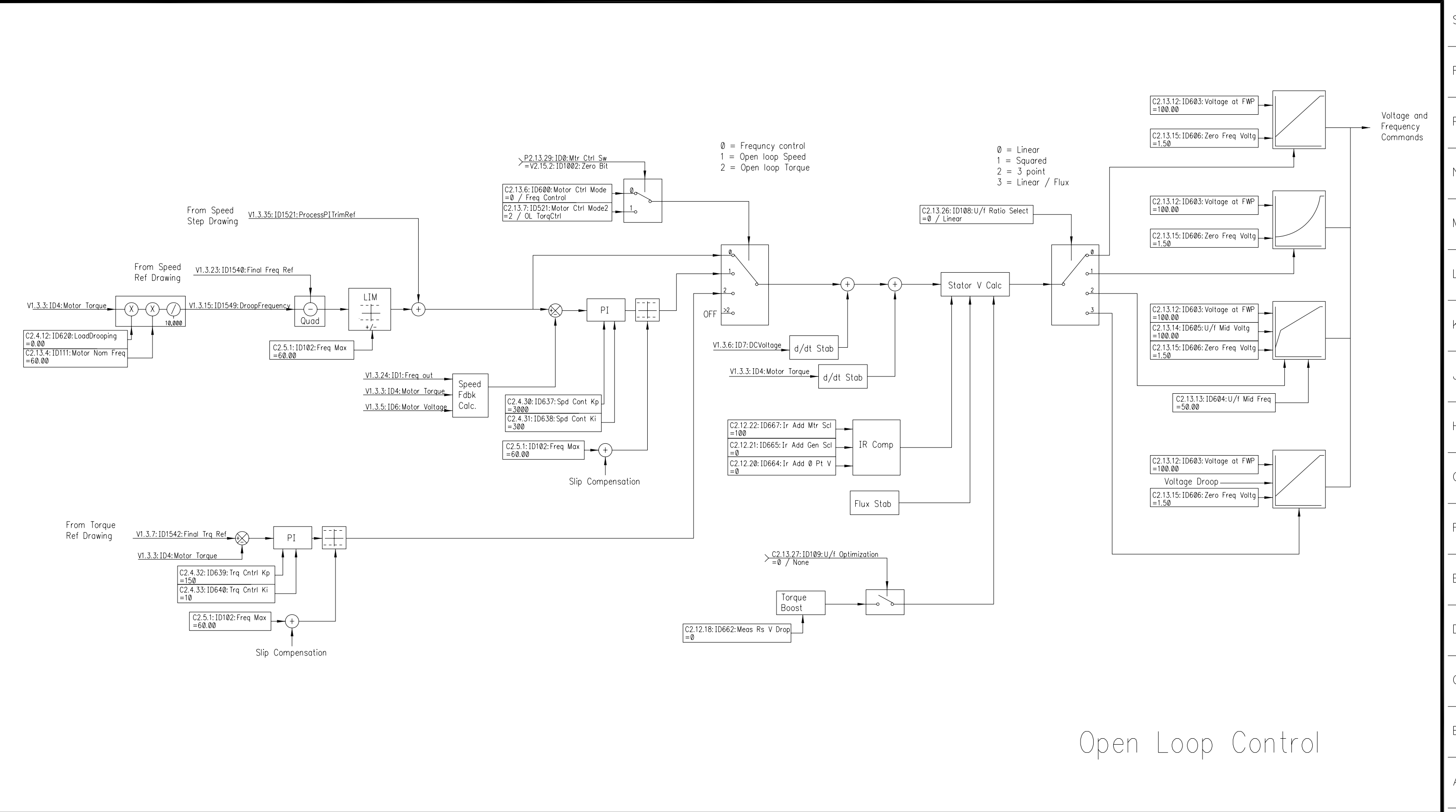
ACCeI500	695117.V10	
MODEL	USED ON	NEXT ASSEMBLY

DRAWN	STEFANCIK	DATE	2/12/10
CHECKED			
ENG. APP'D			
APP'D PROD.			



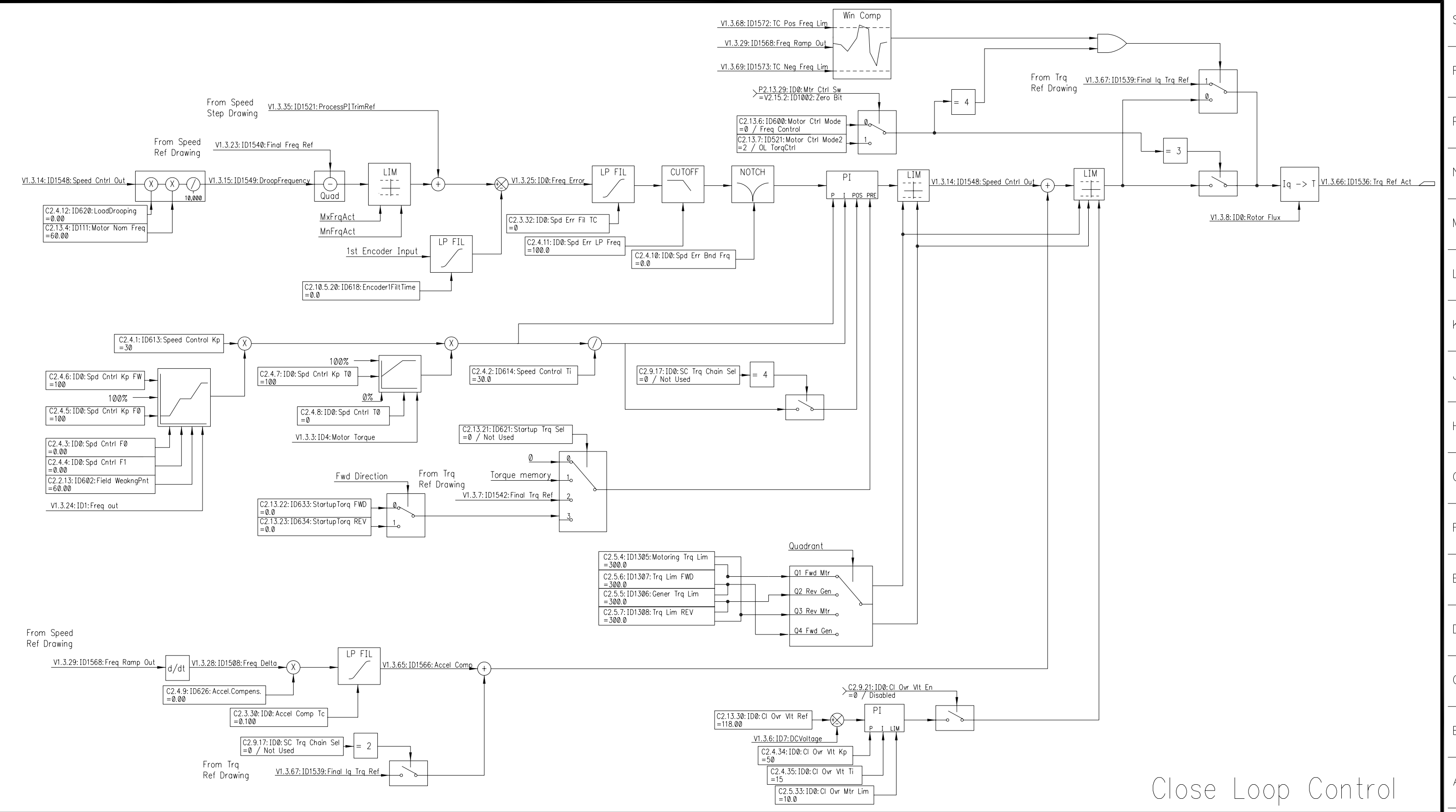
7900 E. PLEASANT VALLEY RD.
INDEPENDENCE, OH 44131 - 5529

SECTION NO.			
DEFAULTS			
CAGE NO.	SIZE	DWG. NO.	FIGURE NO.
01014	B	511710a8	A-8



Open Loop Control

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF AVTRON AND MAY NOT BE DISCLOSED TO OTHERS OR USED FOR MANUFACTURING PURPOSES WITHOUT THE WRITTEN CONSENT OF AVTRON	ACCeI500	695117.V10		DRAWN STEFANCIK	DATE 2/12/10	*  7900 E. PLEASANT VALLEY RD. INDEPENDENCE, OH 44131 - 5529	SECTION NO. DEFAULTS			
				CHECKED						
				ENG. APP'D						
	MODEL	USED ON	NEXT ASSEMBLY	APP'D PROD.				CAGE NO. 01014	SIZE B	DWG. NO. 511710a9



Close Loop Control

THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF AVTRON AND MAY NOT BE DISCLOSED TO OTHERS OR USED FOR MANUFACTURING PURPOSES WITHOUT THE WRITTEN CONSENT OF AVTRON	ACCeI500	695117.V10		DRAWN STEFANCIK	DATE 2/12/10	AVTRON 7900 E. PLEASANT VALLEY RD. INDEPENDENCE, OH 44131 - 5529	SECTION NO. DEFAULTS			
				CHECKED			CAGE NO. 01014	SIZE B	DWG. NO. 511710a10	FIGURE NO. A-10
				ENG. APP'D						
	MODEL	USED ON	NEXT ASSEMBLY	APP'D PROD.						

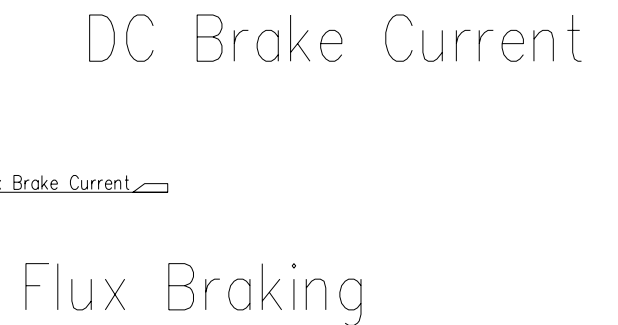


Table 0		Table 1		Table 2		Table 3	
X	Y	X	Y	X	Y	X	Y
C2.11.1.1: ID1700: T0_X0 =-1.00	C2.11.1.17: ID1716: T0_Y0 =0.01	C2.11.2.1: ID1732: T1_X0 =-1.00	C2.11.2.17: ID1748: T1_Y0 =0.01	C2.11.3.1: ID1764: T2_X0 =-1.00	C2.11.3.17: ID1780: T2_Y0 =0.01	C2.11.4.1: ID1796: T3_X0 =-1.00	C2.11.4.17: ID1812: T3_Y0 =0.01
C2.11.1.2: ID1701: T0_X1 =-0.90	C2.11.1.18: ID1717: T0_Y1 =0.01	C2.11.2.2: ID1733: T1_X1 =-0.90	C2.11.2.18: ID1749: T1_Y1 =0.01	C2.11.3.2: ID1765: T2_X1 =-0.90	C2.11.3.18: ID1781: T2_Y1 =0.01	C2.11.4.2: ID1797: T3_X1 =-0.90	C2.11.4.18: ID1813: T3_Y1 =0.01
C2.11.1.3: ID1702: T0_X2 =-0.75	C2.11.1.19: ID1718: T0_Y2 =0.01	C2.11.2.3: ID1734: T1_X2 =-0.75	C2.11.2.19: ID1750: T1_Y2 =0.01	C2.11.3.3: ID1766: T2_X2 =-0.75	C2.11.3.19: ID1782: T2_Y2 =0.01	C2.11.4.3: ID1798: T3_X2 =-0.75	C2.11.4.19: ID1814: T3_Y2 =0.01
C2.11.1.4: ID1703: T0_X3 =-0.60	C2.11.1.20: ID1719: T0_Y3 =0.01	C2.11.2.4: ID1735: T1_X3 =-0.60	C2.11.2.20: ID1751: T1_Y3 =0.01	C2.11.3.4: ID1767: T2_X3 =-0.60	C2.11.3.20: ID1783: T2_Y3 =0.01	C2.11.4.4: ID1799: T3_X3 =-0.60	C2.11.4.20: ID1815: T3_Y3 =0.01
C2.11.1.5: ID1704: T0_X4 =-0.45	C2.11.1.21: ID1720: T0_Y4 =0.01	C2.11.2.5: ID1736: T1_X4 =-0.45	C2.11.2.21: ID1752: T1_Y4 =0.01	C2.11.3.5: ID1768: T2_X4 =-0.45	C2.11.3.21: ID1784: T2_Y4 =0.01	C2.11.4.5: ID1800: T3_X4 =-0.45	C2.11.4.21: ID1816: T3_Y4 =0.01
C2.11.1.6: ID1705: T0_X5 =-0.30	C2.11.1.22: ID1721: T0_Y5 =0.01	C2.11.2.6: ID1737: T1_X5 =-0.30	C2.11.2.22: ID1753: T1_Y5 =0.01	C2.11.3.6: ID1769: T2_X5 =-0.30	C2.11.3.22: ID1785: T2_Y5 =0.01	C2.11.4.6: ID1801: T3_X5 =-0.30	C2.11.4.22: ID1817: T3_Y5 =0.01
C2.11.1.7: ID1706: T0_X6 =-0.15	C2.11.1.23: ID1722: T0_Y6 =0.01	C2.11.1.23: ID1738: T1_X6 =-0.15	C2.11.2.23: ID1754: T1_Y6 =0.01	C2.11.3.7: ID1770: T2_X6 =-0.15	C2.11.3.23: ID1786: T2_Y6 =0.01	C2.11.4.7: ID1802: T3_X6 =-0.15	C2.11.4.23: ID1818: T3_Y6 =0.01
C2.11.1.8: ID1707: T0_X7 =0.00	C2.11.1.24: ID1723: T0_Y7 =0.01	C2.11.2.8: ID1739: T1_X7 =0.00	C2.11.2.24: ID1755: T1_Y7 =0.01	C2.11.3.8: ID1771: T2_X7 =0.00	C2.11.3.24: ID1787: T2_Y7 =0.01	C2.11.4.8: ID1803: T3_X7 =0.00	C2.11.4.24: ID1819: T3_Y7 =0.01
C2.11.1.9: ID1708: T0_X8 =0.15	C2.11.1.25: ID1724: T0_Y8 =0.01	C2.11.2.9: ID1740: T1_X8 =0.15	C2.11.2.25: ID1756: T1_Y8 =0.01	C2.11.3.9: ID1772: T2_X8 =0.15	C2.11.3.25: ID1788: T2_Y8 =0.01	C2.11.4.9: ID1804: T3_X8 =0.15	C2.11.4.25: ID1820: T3_Y8 =0.01
C2.11.1.10: ID1709: T0_X9 =0.30	C2.11.1.26: ID1725: T0_Y9 =0.01	C2.11.2.10: ID1741: T1_X9 =0.30	C2.11.2.26: ID1757: T1_Y9 =0.01	C2.11.3.10: ID1773: T2_X9 =0.30	C2.11.3.26: ID1789: T2_Y9 =0.01	C2.11.4.10: ID1805: T3_X9 =0.30	C2.11.4.26: ID1821: T3_Y9 =0.01
C2.11.1.11: ID1710: T0_X10 =0.45	C2.11.1.27: ID1726: T0_Y10 =0.01	C2.11.2.11: ID1742: T1_X10 =0.45	C2.11.2.27: ID1758: T1_Y10 =0.01	C2.11.3.11: ID1774: T2_X10 =0.45	C2.11.3.27: ID1790: T2_Y10 =0.01	C2.11.4.11: ID1806: T3_X10 =0.45	C2.11.4.27: ID1822: T3_Y10 =0.01
C2.11.1.12: ID1711: T0_X11 =0.60	C2.11.1.28: ID1727: T0_Y11 =0.01	C2.11.2.12: ID1743: T1_X11 =0.60	C2.11.2.28: ID1759: T1_Y11 =0.01	C2.11.3.12: ID1775: T2_X11 =0.60	C2.11.3.28: ID1791: T2_Y11 =0.01	C2.11.4.12: ID1807: T3_X11 =0.60	C2.11.4.28: ID1823: T3_Y11 =0.01
C2.11.1.13: ID1712: T0_X12 =0.75	C2.11.1.29: ID1728: T0_Y12 =0.01	C2.11.2.13: ID1744: T1_X12 =0.75	C2.11.2.29: ID1760: T1_Y12 =0.01	C2.11.3.13: ID1776: T2_X12 =0.75	C2.11.3.29: ID1792: T2_Y12 =0.01	C2.11.4.13: ID1808: T3_X12 =0.75	C2.11.4.29: ID1824: T3_Y12 =0.01
C2.11.1.14: ID1713: T0_X13 =0.90	C2.11.1.30: ID1729: T0_Y13 =0.01	C2.11.2.14: ID1745: T1_X13 =0.90	C2.11.2.30: ID1761: T1_Y13 =0.01	C2.11.3.14: ID1777: T2_X13 =0.90	C2.11.3.30: ID1793: T2_Y13 =0.01	C2.11.4.14: ID1809: T3_X13 =0.90	C2.11.4.30: ID1825: T3_Y13 =0.01
C2.11.1.15: ID1714: T0_X14 =1.00	C2.11.1.31: ID1730: T0_Y14 =0.01	C2.11.2.15: ID1746: T1_X14 =1.00	C2.11.2.31: ID1762: T1_Y14 =0.01	C2.11.3.15: ID1778: T2_X14 =1.00	C2.11.3.31: ID1794: T2_Y14 =0.01	C2.11.4.15: ID1810: T3_X14 =1.00	C2.11.4.31: ID1826: T3_Y14 =0.01
C2.11.1.16: ID1715: T0_X15 =1.00	C2.11.1.32: ID1731: T0_Y15 =0.01	C2.11.2.16: ID1747: T1_X15 =1.00	C2.11.2.32: ID1763: T1_Y15 =0.01	C2.11.3.16: ID1779: T2_X15 =1.00	C2.11.3.32: ID1795: T2_Y15 =0.01	C2.11.4.16: ID1811: T3_X15 =1.00	C2.11.4.32: ID1827: T3_Y15 =0.01

Table Arrays

APPENDIX B

PARAMETER LIST

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
1	Monitor					Menu Name
1.1	Multimonitor					Menu Name
1.2	Appl Digital					Menu Name
1.2.1	Cntrl Inhib	1099	0	1		Inverse of MC_Run. Used to reset loops when drive is off.
1.2.2	MC Run	1098	0	1		Drive is running. Bit from status word from firmware.
1.2.3	MC Ready	1115	0	1		Drive is ready to run status from firmware
1.2.4	MC Fault	1116	0	1		Drive is in a fault condition.
1.2.5	MC Reverse	1086	0	1		Status from firmware on direction
1.2.6	MC AtSpeed	1118	0	1		Drive is done ramping to its speed setpoint. From firmware.
1.2.7	MC Warning	1117	0	1		Drive is in a warning state. Bit from status word from firmware
1.2.8	Run OK	1091	0	1		All the interlocks are met to enable a run command.
1.2.9	Start Input	1089	0	1		Run jog or thread is requested.
1.2.10	Reverse	1128	0	1		Reverse commanded by remote, keypad or computer.
1.2.11	Run Enable	1096	0	1		Run is commanded and it is enabled.
1.2.12	RJT Enable	1097	0	1		Run jog or thread commanded and enabled.
1.2.13	Thread Enable	1095	0	1		Thread mode is commanded and enabled.
1.2.14	Jog enable	1094	0	1		Jog enabled
1.2.15	Jog FR Input	1087	0	1		Either jog forward or jog reverse is commanded.
1.2.16	RunRequest	1090	0	1		Run request: 0=no, 1=yes
1.2.17	PC Control	1121	0	1		Control has been transferred to the PC.
1.2.18	Run In Max	1100	0	1		In max draw limit
1.2.19	Run In Min	1101	0	1		In minimum draw limit
1.2.20	Neg Spd Ref	1129	0	1		Speed reference is negative
1.2.21	In Skip Freq	1085	0	1		Speed reference is in a skip frequency. Optional faster ramp rates
1.2.22	Ten Stpt Max	1102	0	1		Tension setpoint block in its maximum limit
1.2.23	Ten Stpt Min	1103	0	1		Tension setpoint block in its minimum limit
1.2.24	Ten PI Max	1109	0	1		Tension PI regulator has reached its max limit. Not implemented in this version.
1.2.25	Ten PI Min	1108	0	1		Tension PI regulator has reached its min limit. Not implemented in this version.
1.2.26	Ten At Min	1106	0	1		Tension below its minimum setpoint.
1.2.27	Ten At Max	1105	0	1		Tension feedback is higher than its maximum setpoint
1.2.28	Over Temp Warn	1114	0	1		Unit above 85 C. 90 C will trip unit
1.2.29	Therm Warn Act	1120	0	1		Inverter thermister warning
1.2.30	UV Warn	0	0	1		Under voltage warning detected.
1.2.31	OC Warn	0	0	1		Over current warning detected.
1.2.32	OV Warn	0	0	1		Over voltage warning detected.
1.2.33	Ext Warn	0	0	1		External warning detected. See Ext Fault Response for action.
1.2.34	Mtr OT Warn	0	0	1		Motor Over temperature warning
1.2.35	Ident Warn	0	0	1		Warning has occurred during identification
1.2.36	Sp Bmp Dn1	1150	0	1		Spare bumpless block is done ramping to the first input.
1.2.37	Sp Bmp Dn2	1151	0	1		Spare bumpless block is done ramping to the second input.
1.2.38	Sp HL Max	1563	0	1		Spare High/Low comparator above its max setpoint.
1.2.39	Sp HL Min	1564	0	1		Spare High/Low comparator below its min setpoint.
1.2.40	Sp Cmp1 Eq	1152	0	1		First spare comparator input and threshold difference is within the hysteresis value.
1.2.41	Sp Cmp1 Out	1153	0	1		First spare comparator input is greater than the threshold plus/minus the hysteresis value.
1.2.42	Sp Cmp2 Eq	1154	0	1		Second spare comparator input and threshold difference is within the hysteresis value.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
1.2.43	Sp Cmp2 Out	1155	0	1		Second spare comparator input is greater than the threshold plus/minus the hysteresis value.
1.2.44	Sp Dly1 Out	1156	0	1		First spare delay block output bit.
1.2.45	Sp Dly2 Out	1157	0	1		Second spare delay block output bit.
1.2.46	Sp Lch1 Out	1158	0	1		First spare latch block output.
1.2.47	Sp Lch2 Out	1159	0	1		Second spare latch block output.
1.2.48	Sp Lch3 Out	1160	0	1		Third spare latch block output.
1.2.49	Sp Inv1 Out	1161	0	1		First spare bit invert output.
1.2.50	Sp Inv2 Out	1162	0	1		Second spare bit invert output.
1.2.51	Sp Inv3 Out	1163	0	1		Third spare bit invert output.
1.2.52	Sp And1 Out	1164	0	1		First spare and output.
1.2.53	Sp And2 Out	1165	0	1		Second spare and output.
1.2.54	Sp And3 Out	1166	0	1		Third spare and output.
1.2.55	Sp Or1 Out	1167	0	1		First spare or output.
1.2.56	Sp Or2 Out	1168	0	1		Second spare or output.
1.2.57	Sp Or3 Out	1169	0	1		Third spare or output.
1.2.58	At Zero Spd	1127	0	1		Speed feedback is near zero speed.
1.2.59	Watchdog Out	1003	0	1		Inverse of PB_Watchdog_In. Used to verify communications for field bus device by toggling a bit.
1.2.60	WD Trip	0	0	1		Communications watch dog timer is in fault condition.
1.2.61	ST Cntr Hold	1065	0	1		Stop tape counter hold bit.
1.2.62	ST Cntr Res	1064	0	1		Stop tape counter reset bit.
1.2.63	ST Fire Out	1063	0	1		Output bit to fire fingers.
1.2.64	ST Ramt to 0	1062	0	1		Ramp speed to zero for stop tapes
1.3	Appl Analog					Menu Name
1.3.1	Motor Speed	2	-10000	10000		[R] Motor speed in rpm
1.3.2	Motor Current	3	0.00	MotorCurrent Max		Motor current. = MotorCurrent/current scale = Amps
1.3.3	Motor Torque	4	-300.0	300.0		[R] Motor torque as % value, +1000 equals +100.0 %//pos=clockwise, neg=counterclockwise
1.3.4	Motor Power	5	-300.0	300.0		Motor shaft power filtered. 1000 = 100%
1.3.5	Motor Voltage	6	0.0	1000.0		[R] Motor voltage in 0.1 Volts, e.g. 100 equals to 10.0V
1.3.6	DCVoltage	7	0	1000		DC voltage in Volts with 32 ms time constant.
1.3.7	Final Trq Ref	1542	-300.0	300.0		Final, limited torque reference for speed/torque controller
1.3.8	Rotor Flux	0	-300.0	300.0		Estimated rotor flux, 1000 = nominal
1.3.9	MtrCalcTemp	9	0.0	1000.0		Calculated motor temperature. 1000 = 100%
1.3.10	Unit Temperature	8	-50	300		Drive temperature in degrees C
1.3.11	Id Ref	0	-300.0	300.0		Final IdReference 1000 = motor nominal current
1.3.12	Control Place	1505	1	3		Location of reference. 0 = remote, 1 = keypad, 2 = computer
1.3.13	Cntrl Mode	1506	0	4		0 = Off, 1 = Run, 2 = Thread, 3 = Jog F, 4 = Jog R
1.3.14	Speed Cntrl Out	1548	-327.67	327.67		TorqueReference from Speed controller output
1.3.15	DroopFrequency	1549	-327.67	327.67		Droop Frequency subtracted off of speed reference
1.3.16	Run Stpt Dif	1501	-327.67	327.67		Draw from setpoint block. Either in Hz difference or ratio
1.3.17	Draw Ref	1502	-327.67	327.67		Output of Setpoint block in Hz.
1.3.18	Run Stpt	1503	-327.67	327.67		Run setpoint after draw
1.3.19	RJT Ref	1504	-327.67	327.67		RJT thread reference
1.3.20	Freq Reference	1507	0.00	320.00		Speed reference after checking for skip frequency
1.3.21	ABS RJT Ref	1570	0.00	327.67		Absolute value of speed reference
1.3.22	FreqReference	25	-320.00	320.00		[W] Frequency reference to motor control, f[Hz] = FreqRef/FreqScale//If FreqScale=100 then 5000 equals 50.00 Hz
1.3.23	Final Freq Ref	1540	-320.00	320.00		Final shaft frequency reference for speed controller in FreqScale
1.3.24	Freq out	1	-320.00	320.00		[R] Output frequency to motor, f[Hz] = FreqOut/FreqScale//If FreqScale=100 then 5000 equals 50.00 Hz
1.3.25	Freq Error	0	-327.67	327.67		Frequency Error
1.3.26	Acceleration Tim	0	0.1	3000.0		Acceleration time in RampTimeScale, Acceleration=FreqRamp[Hz]/AccelerationTime[s]
1.3.27	DecelerationTime	0	0.1	3000.0		Deceleration time in RampTimeScale, Deceleration=FreqRamp[Hz]/DecelerationTime[s]
1.3.28	Freq Delta	1508	-300.00	300.00		Acceleration in FreqScale/s

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
1.3.29	Freq Ramp Out	1568	0.00	FreqMax		[R] Output of ramp generator//f[Hz]=FreqRampOut/FreqScale//If FreqScale=100 then 5000 equals 50.00 Hz.
1.3.30	Brake Chopper	1509	0	1		0 = no brake chopper, 1 = brake chopper is installed
1.3.31	BrakeResistor	1511	0	1		1 = no brake resistor, 1 = brake resistor is installed
1.3.32	Step Ref	1520	-327.67	327.67		Step speed reference before limit check
1.3.33	Sup Sout	1518	-327.67	327.67		Slack step references
1.3.34	Sup Sout Rp	1519	-327.67	327.67		Slack step after ramping
1.3.35	ProcessPITrimRef	1521	-327.67	327.67		Process PI Trim Frequency reference (in FreqScale)
1.3.36	Ten Inp Stall	1512	-327.67	327.67		Either tension or stall reference
1.3.37	Ten Bal Dif	0	-327.67	327.67		Difference held by the balance block
1.3.38	Ten Bal out	1513	-327.67	327.67		Output of the tension balance block
1.3.39	Ten Spt	1514	-327.67	327.67		Ten reference after inc/dec block
1.3.40	Ten Spt Dif	1515	-327.67	327.67		Tension Inc/Dec block difference.
1.3.41	Ten Ramped	1516	-327.67	327.67		Ten reference after ramping
1.3.42	Tension Ref	1517	-327.67	327.67		Tension reference to error block
1.3.43	Ten PI Out	1522	-327.67	327.67		Output of Tension PI regulator
1.3.44	Ten SUP	1523	-327.67	327.67		Output of the tension loop with slacks.
1.3.45	Ten Spd Err	1524	-327.67	327.67		Output of the tension loop regulator. Can be used as a speed trim, torque reference or analog out.
1.3.46	MtrRegStatus	1525	0	256		Status of motor limit regulators, 0=not active, 1=active//B0=motoring current regulator//B1=generating current reg.//B2=motoring torque reg.//B3=generating torque reg.//B4=over voltage reg. //B5=under voltage reg.
1.3.47	MotorCurLimit	1526	0.00	MotorCurrent Max		Motor current limit, I[A] = MotorCurrentLimit/CurrentScale//Range[1...65535]//If CurrentScale=10 then 100 equals 10.0 A
1.3.48	Sp Tbl0 Out	1550	-327.67	327.67		Output of the first spare table block
1.3.49	Sp Tbl1 Out	1551	-327.67	327.67		Output of the second spare table block
1.3.50	Sp Tbl2 Out	1552	-327.67	327.67		Output of the third spare table block
1.3.51	Sp MD1 Out	1553	-327.67	327.67		First spare MULDIV output
1.3.52	Sp MD2 Out	1554	-327.67	327.67		Second spare MULDIV output
1.3.53	Sp Add1 Out	1555	-327.67	327.67		Spare Add block output
1.3.54	Sp Sub1 Out	1565	-327.67	327.67		Spare sub block output.
1.3.55	Sp LP Fil Out	1557	-327.67	327.67		Output of spare low pass filter
1.3.56	Sp ABS Out	1558	0.00	327.67		Spare ABS block output
1.3.57	Sp Sum1 Out	1559	-327.67	327.67		Sp sum block output
1.3.58	Sp Bmp Out	1560	-327.67	327.67		Spare bump block output
1.3.59	Sp Sel1 Out	1561	-327.67	327.67		First spare select block output.
1.3.60	Sp Sel2 Out	1562	-327.67	327.67		Second spare select block output.
1.3.61	Sp Lim Out	1574	-327.67	327.67		Spare limit value output
1.3.62	Torque Reference	18	-300.0	300.0		Torque reference 3000 = 300%
1.3.63	Active Flt Last	37	0	2000		[R] Last active fault code.
1.3.64	Mtr Cur ID	45	0.0	MotorCurrent Max		Motor current from the Identification
1.3.65	Accel Comp	1566	-500.0	500.0		AccelCompensation IqReference, 1000 = motor nominal current
1.3.66	Trq Ref Act	1536	-500.0	500.0		Adjusted TorqueReference (-3000...3000) = -300...300%
1.3.67	Final Iq Trq Ref	1539	-300.0	300.0		Final, limited Iq reference for speed/torque controller
1.3.68	TC Pos Freq Lim	1572	-320.00	320.00		Upper frequency limit in Torque Control (signed)
1.3.69	TC Neg Freq Lim	1573	-320.00	320.00		Lower frequency limit in Torque Control (signed)
1.4	Digital IO					Menu Name
1.4.1	DIN 1	1011	0	1		First digital input value.
1.4.2	DIN 2	1012	0	1		Second digital input value.
1.4.3	DIN 3	1013	0	1		Third digital input value.
1.4.4	DIN 4	1014	0	1		Fourth digital input value.
1.4.5	DIN 5	1015	0	1		Fifth digital input value.
1.4.6	DIN 6	1016	0	1		Sixth digital input value.
1.4.7	DIN 7	1017	0	1		Seventh digital input value. Default to zero. Used for additional digital input boards.
1.4.8	DIN 8	1018	0	1		Eight digital input value. Default to zero. Used for additional digital input boards.
1.4.9	Not DIN 1	1021	0	1		Inverse of digital input 1

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
1.4.10	Not DIN 2	1022	0	1		Inverse of digital input 2
1.4.11	Not DIN 3	1023	0	1		Inverse of digital input 3
1.4.12	Not DIN 4	1024	0	1		Inverse of digital input 4
1.4.13	Not DIN 5	1025	0	1		Inverse of digital input 5
1.4.14	Not DIN 6	1026	0	1		Inverse of digital input 6
1.4.15	Not DIN 7	1027	0	1		Inverse of digital input 7
1.4.16	Not DIN 8	1028	0	1		Inverse of digital input 8
1.5	Analog IO					Menu Name
1.5.1	AI1 Type	0	0	5		First analog input type
1.5.2	AI2 Type	0	0	5		Second analog input type
1.5.3	AI3 Type	0	0	5		Three analog input type
1.5.4	AI4 Type	0	0	5		Fourth analog input type
1.5.5	AIN1	1601	-327.67	327.67		First analog input after scaling and filtering
1.5.6	AIN2	1602	-327.67	327.67		Second analog input after scaling and filtering
1.5.7	AIN3	1603	-327.67	327.67		Third analog input after scaling and filtering
1.5.8	AIN4	1604	-327.67	327.67		Fourth analog input after scaling and filtering
1.5.9	AIN1 Fault	0	0	1		Fault if 4-20ma or 2-10 volt is below min limit
1.5.10	AIN2 Fault	0	0	1		Fault if 4-20ma or 2-10 volt is below min limit
1.5.11	AIN3 Fault	0	0	1		Fault if 4-20ma or 2-10 volt is below min limit
1.5.12	AIN4 Fault	0	0	1		Fault if 4-20ma or 2-10 volt is below min limit
1.5.13	AOUT1 Val	1590	-327.67	327.67		Value of first analog out. +/- 10,000 to full scale
1.5.14	AOUT2 Val	1591	-327.67	327.67		Value of second analog out. +/- 10,000 to full scale
1.5.15	AOUT3 Val	1592	-327.67	327.67		Value of third analog out. +/- 10,000 to full scale
1.5.16	AOUT4 Val	1593	-327.67	327.67		Value of fourth analog out. +/- 10,000 to full scale
1.5.17	Enc1 Out	1609	-327.67	327.67		First encoder input after scaling and low pass filter
1.5.18	Enc2 Out	1610	-327.67	327.67		Second encoder input after scaling and low pass filter
1.5.19	Counter1	1528	-32767	32767		First encoder counter output after scaling
1.5.20	Counter2	1529	-32767	32767		Second encoder counter output after scaling
1.6	FB I/O					Menu Name
1.6.1	Digital Inputs					Menu Name
1.6.1.1	FB Bit00	1040	0	1		Bit 0 data from field bus selected by FB Bit Sel 1
1.6.1.2	FB Bit01	1041	0	1		Bit 1 data from field bus selected by FB Bit Sel 1
1.6.1.3	FB Bit02	1042	0	1		Bit 2 data from field bus selected by FB Bit Sel 1
1.6.1.4	FB Bit03	1043	0	1		Bit 3 data from field bus selected by FB Bit Sel 1
1.6.1.5	FB Bit04	1044	0	1		Bit 4 data from field bus selected by FB Bit Sel 2
1.6.1.6	FB Bit05	1045	0	1		Bit 5 data from field bus selected by FB Bit Sel 2
1.6.1.7	FB Bit06	1046	0	1		Bit 6 data from field bus selected by FB Bit Sel 2
1.6.1.8	FB Bit07	1047	0	1		Bit 7 data from field bus selected by FB Bit Sel 2
1.6.1.9	FB Bit08	1048	0	1		Bit 8 data from field bus selected by FB Bit Sel 3
1.6.1.10	FB Bit09	1049	0	1		Bit 9 data from field bus selected by FB Bit Sel 3
1.6.1.11	FB Bit10	1050	0	1		Bit 10 data from field bus selected by FB Bit Sel 3
1.6.1.12	FB Bit11	1051	0	1		Bit 11 data from field bus selected by FB Bit Sel 3
1.6.1.13	FB Bit12	1052	0	1		Bit 12 data from field bus selected by FB Bit Sel 4
1.6.1.14	FB Bit13	1053	0	1		Bit 13 data from field bus selected by FB Bit Sel 4
1.6.1.15	FB Bit14	1054	0	1		Bit 14 data from field bus selected by FB Bit Sel 4
1.6.1.16	FB Bit15	1055	0	1		Bit 15 data from field bus selected by FB Bit Sel 4
1.6.1.17	FB Fix Cntrl Wrđ	1621	-32767	32767		Fixed Control word Can set the FB bits if selected//B0 - RUN //B1 - DIRECTION//B2 - FaultRST//B3 - FBDIN1 //B4 - FBDIN2 //B5 - FBDIN3 //B6 - FBDIN4 //B7 - FBDIN5 //B8 - BusCtrl//B9 - BusRef//B10 - FBDIN6//B11 - FBDIN7//B12 - FBDIN8//B13 - FBDIN9//B14 - FBD
1.6.1.18	FB Gen Cntl Wrđ	1630	-32767	32767		General control word. Can be used to set the FB bits if selected//B0 - RUN //B1 - DIRECTION//B2 - FaultRST//B3 - FBDIN1 //B4 - FBDIN2 //B5 - FBDIN3 //B6 - FBDIN4 //B7 - FBDIN5 //B8 - BusCtrl//B9 - BusRef//B10 - FBDIN6//B11 - FBDIN7//B12 - FBDIN8//B13 - FBDIN9//B14 - FBDApplcation Specific control word
1.6.1.19	FB Gen Sts Word	1631	-32767	32767		Status word (bits B0...B15) Binary Coded, Application Specific//B0 - B7 Digital Outputs//B8 Fieldbuscard & Application specifid fieldbus process data in use
1.6.2	Analog Inputs					Menu Name

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
1.6.2.1	FB Word In 1	1611	-327.67	327.67		First int in from field bus
1.6.2.2	FB Word In 2	1612	-327.67	327.67		Second int input from field bus
1.6.2.3	FB Word In 3	1613	-327.67	327.67		Third int input from field bus
1.6.2.4	FB Word In 4	1614	-327.67	327.67		Fourth int input from field bus
1.6.2.5	FB Word In 5	1615	-327.67	327.67		Fifth int input from field bus
1.6.2.6	FB Word In 6	1616	-327.67	327.67		Sixth int input from field bus
1.6.2.7	FB Word In 7	1617	-327.67	327.67		Seventh int input from field bus
1.6.2.8	FB Word In 8	1618	-327.67	327.67		Eighth int input from field bus
1.6.2.9	FB Word In 9	1619	-327.67	327.67		Ninth int input from field bus
1.6.2.10	FB Word In 10	1620	-327.67	327.67		Tenth int input from field bus
1.6.2.11	FB Spd Ref	1632	-327.67	327.67		Speed reference from field bus. Enter RPM gets converted to percentage. Typically this value is in percent of the frequency area between the set minimum and maximum frequency.
1.6.3	Analog Outputs					Menu Name
1.6.3.1	FB Word Out 1	1622	-327.67	327.67		Application Specific process data
1.6.3.2	FB Word Out 2	1623	-327.67	327.67		Application Specific process dataApplication Specific process data
1.6.3.3	FB Word Out 3	1624	-327.67	327.67		Application Specific process dataApplication Specific process dataApplication Specific process data
1.6.3.4	FB Word Out 4	1625	-327.67	327.67		Application Specific process dataApplication Specific process dataApplication Specific process data
1.6.3.5	FB Word Out 5	1626	-327.67	327.67		Application Specific process dataApplication Specific process dataApplication Specific process dataApplication Specific process data
1.6.3.6	FB Word Out 6	1627	-327.67	327.67		Application Specific process dataApplication Specific process dataApplication Specific process dataApplication Specific process data
1.6.3.7	FB Word Out 7	1628	-327.67	327.67		Application Specific process dataApplication Specific process dataApplication Specific process dataApplication Specific process data
1.6.3.8	FB Word Out 8	1629	-327.67	327.67		Application Specific process dataApplication Specific process dataApplication Specific process dataApplication Specific process dataApplication Specific process data
1.7	SB Data					Menu Name
1.7.1	SB WD Pulse	0	0	1		Toggles every 100 ms. Used to tell slaves that the master is still communicating over the system bus.
1.7.2	MD WD OK	1172	0	1		Master sections Watchdog is OK.
1.7.3	MD Watchdog	1061	0	1		Watchdog bit from SB master section.
1.7.4	SB In Cntl Word	1530	0	32767		System bus control word from the master section.
1.7.5	SB In Freq Ref	1531	-327.67	327.67		System Bus frequency reference from the master.
1.7.6	SB In Int1	1532	-327.67	327.67		System bus first configurable integer input from master section.
1.7.7	SB In Int2	1533	-327.67	327.67		System bus second configurable integer input from master section.
1.7.8	SB In Trq Ref	1535	-327.67	327.67		System Bus torque reference from the master.
1.7.9	SB Out Cntl Word	1534	0	32767		System bus control word out of the slave sections
1.7.10	MD Drive OK	1058	0	1		System bus master section Drive OK Bit.
1.7.11	MD Run Enable	1060	0	1		System bus master section Run Enable is high.
1.7.12	SB Comm Lost	0	0	1		System bus is not communicating
2	Parameters					Menu Name
2.1	Protections					Menu Name
2.1.1	Fault Reset	0	0	2000	1002	Fault reset. Default to Zero Bit.
2.1.2	User Flt 1	0	0	2000	1002	First user fault configuration point. Default to Zero Bit.
2.1.3	User Flt 2	0	0	2000	1002	Second user fault configuration point. Default to Zero Bit.
2.1.4	User Flt 3	0	0	2000	1002	Third user fault configuration point. Default to Zero Bit.
2.1.5	User Flt 4	0	0	2000	1002	Fourth user fault configuration point. Default to Zero Bit.
2.1.6	User Flt1 Resp	0	0	3	2 / Fault	Response to the 1st user fault.
2.1.7	User Flt2 Resp	0	0	3	2 / Fault	Response to the 2nd user fault.
2.1.8	User Flt3 Resp	0	0	3	2 / Fault	Response to the 3rd user fault.
2.1.9	User Flt4 Resp	0	0	3	2 / Fault	Response to the 4th user fault.
2.1.10	Ext Fault Inp	0	0	2000	1002	External fault input. High for fault Default to zero bit.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.1.11	Ext Flt Resp	701	0	3	2 / Fault	Set Drive response to an external fault. Ignore, Warn, Fault, Fault coast
2.1.12	Overspeed Resp	0	0	3	3 / Fault,Coast	Response to drive overspeed. Default to coast stop and fault the drive.
2.1.13	Input Ph. Superv	730	0	3	0 / No Action	Set response to an input phase fault. Ignore, Warn, Fault, Fault coast
2.1.14	UVolt Fault Resp	727	0	1	0 / Fault Stored	Set Drive response to an under voltage fault. Ignore, Warn, Fault, Fault coast
2.1.15	Phase Supv F	702	0	3	2 / Fault	Set Drive response to an output phase fault. Ignore, Warn, Fault, Fault coast
2.1.16	Earth Fault	703	0	3	2 / Fault	Set Drive response to a ground fault. Ignore, Warn, Fault, Fault coast
2.1.17	Therm Prot F	704	0	3	2 / Fault	Set Drive response to a motor thermal fault. Ignore, Warn, Fault, Fault coast
2.1.18	MotAmbTempFactor	705	-100.0	100.0	0.0	[W] Ambient temperature factor,(-1000... 1000) 0= nominal, 1000= max, $kt=(T_{amb}-T_n)/(T_{max}-T_n)*1000$.
2.1.19	Mot Therm 0 Spd	706	0.0	150.0	40.0	[W] Motor cooling ability at zero speed unit 0,1%. Init := 400
2.1.20	Mtr Therm TC	707	1	200	10	[W] Motor Thermal Time Constant in minutes, (1... 200). Init := 45
2.1.21	Motor Duty Cycle	708	0	100	100	[W] Motor Duty Cycle in %. Init := 100
2.1.22	Stall Protection	709	0	3	0 / No Action	Set Drive response to a stall fault. Ignore, Warn, Fault, Fault coast
2.1.23	Stall Cur Lim	710	MotorCurrentMin	MotorCurrentMax	4.80	[W] Current limit of motor stall protection, $I[A] = \text{StallCurrentLimit}/\text{CurrentScale}/(1...65535)/\text{if CurrentScale}=10 \text{ then } 100 \text{ equals } 10.0 \text{ A. Init := } 100$
2.1.24	Stall Time	711	1.00	120.00	15.00	[W] Max time for stall in 0,01s (100 ... 12000). Init := 1500
2.1.25	Stall Freq	712	1.00	Max_Frequency	25.00	[W] Max frequency for stall protection, $f[Hz] = \text{StallFrequency}/\text{FreqScale}$. Init := 2500
2.1.26	ULoad Protect F	713	0	3	0 / No Action	Set Drive response to a loss of load fault. Ignore, Warn, Fault, Fault coast
2.1.27	Under Ld Trq Nom	714	10.0	150.0	50.0	[W] Underload load curve at nominal freq,unit = 0.1%. Init := 500
2.1.28	Under Ld Trq 0	715	5.0	150.0	10.0	[W] Underload load curve at zero freq,unit = 0.1%. Init := 100
2.1.29	Under Ld State T	716	2.00	600.00	20.00	[W] Time limit for underload supervision in 0.01 sec (0 65536). Init := 2000
2.1.30	ThermistorF.Resp	732	0	3	2 / Fault	Set Drive response to a thermistor fault. Ignore, Warn, Fault, Fault coast
2.1.31	FBComm.FaultResp	733	0	3	2 / Fault	Set Drive response to a field bus fault. Ignore, Warn, Fault, Fault coast
2.1.32	SPI Flt Resp	734	0	3	2 / Fault	Set Drive response to a slot communication fault. Ignore, Warn, Fault, Fault coast
2.1.33	Auto Rst Wait	717	0.10	10.00	0.50	Wait time between logging separate instance of the same fault. Enter in seconds.
2.1.34	Auto Rst SVTime	718	0.00	60.00	30.00	Used with trials. The drive will allow the number of trial resets on this fault within this given time Entered in seconds.
2.1.35	Auto Rst StartM	719	0	2	0 / Ramping	0 = ramp,1 = flying start,2 = system defined
2.1.36	Auto Rst UV Trls	720	0	10	0	Determines the numbe of auto restarts allowed in the trial time for the undervoltage fault.
2.1.37	Auto Rst OV Trls	721	0	10	0	Determines the numbe of auto restarts allowed in the trial time for the over voltage fault.
2.1.38	Auto Rst OC Trls	722	0	3	0	Determines the numbe of auto restarts allowed in the trial time for the over current fault.
2.1.39	Auto Rst Mtr OT	726	0	10	0	Determines the numbe of auto restarts allowed in the trial time for the motor temperature fault.
2.1.40	Auto Rst ExtF T	725	0	10	0	Determines the numbe of auto restarts allowed in the trial time for the external fault.
2.1.41	Auto Rst Uload T	738	0	10	0	Determines the numbe of auto restarts allowed in the trial time for the under load fault.
2.1.42	WD Flt Response	0	0	3	2 / Fault	Response to a communication watch dog time out. Default to fault the drive.
2.1.43	Com WD	0	0	1	0 / Disabled	Enables the communications watchdog timer. Default to not run it.
2.1.44	MD WD	0	0	2000	1061	SB slave watchdog input configuration. Default to master watchdog bit over the fiber bus.
2.2	Setpoints					Menu Name
2.2.1	Run Speed	1254	-327.67	327.67	20.00	Default run speed if a fix value is desired. Default to 0 - 100% speed
2.2.2	Thread Speed	1255	-327.67	327.67	10.00	Default thread speed. Used if a fixed value is desired.
2.2.3	Jog F Speed	1256	-327.67	327.67	5.00	Fixed jog forward speed setpoint.
2.2.4	Jog R Speed	1257	-320.00	320.00	-5.00	Jog reverse speed setpoint.
2.2.5	Draw Stpt	1251	-327.67	327.67	1.00	Draw setpoint. Configurable to ratio or difference draw. Default is ratio of 1.00.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.2.6	Spd Slk Up	1273	-327.67	327.67	10.00	Speed step slack up value
2.2.7	Spd Slk Out	1274	-327.67	327.67	-10.00	Speed step slack out value.
2.2.8	Skip Freq H1	510	0.00	320.00	0.00	First skip freq high value
2.2.9	Skip Freq L1	509	0.00	320.00	0.00	First skip freq low value in Hz
2.2.10	Skip Freq L2	511	0.00	320.00	0.00	Second skip freq low value in Hz
2.2.11	Skip Freq H2	512	0.00	320.00	0.00	Second skip freq high value in Hz
2.2.12	Trq Ref StA	1302	-300.0	300.0	0.0	Fixed value for the first torque reference input if desired. Enter in percent torque.
2.2.13	Field WeakngPnt	602	8.00	320.00	60.00	[W] Field weakening point, f[Hz] = FieldWeakeningPoint/FreqScale//If FreqScale=100 then 5000 equals 50.00 Hz
2.2.14	Trq Ref StB	1303	-300.0	300.0	0.0	Fixed value for the second torque reference input if desired. Enter in percent torque.
2.2.15	Ten Stall	1261	-327.67	327.67	10.00	Tension stall setpoint value.
2.2.16	Ten Ref	1262	-327.67	327.67	50.00	Tension setpoint if a fixed value is desired.
2.2.17	Ten Slk Up	1283	-327.67	327.67	0.10	Tension loop out of range slack up value.
2.2.18	Ten Slk Out	1284	-327.67	327.67	-10.00	Tension loop out of range slack out value.
2.2.19	Sp Sum1 StA	1330	-327.67	327.67	0.00	Sp sum blocks first inputs default calibration value..
2.2.20	Sp Sum1 StB	1331	-327.67	327.67	0.00	Sp sum blocks second inputs default calibration value..
2.2.21	Sp Sum1 StC	1332	-327.67	327.67	0.00	Sp sum blocks third inputs default calibration value..
2.2.22	Sp Bmp St1	1335	-327.67	327.67	0.00	Spare bumpless block default calibration value for the first input.
2.2.23	Sp Bmp St2	1336	-327.67	327.67	0.00	Spare bumpless block default calibration value for the second input.
2.2.24	Sp Sel1 ST0	1337	-327.67	327.67	0.00	First spare select block input 0 default calibration value.
2.2.25	Sp Sel1 ST1	1338	-327.67	327.67	0.00	First spare select block input 1 default calibration value.
2.2.26	Sp Sel2 ST0	1339	-327.67	327.67	0.00	Second spare select block input 0 default calibration value.
2.2.27	Sp Sel2 ST1	1340	-327.67	327.67	0.00	Second spare select block input 1 default calibration value.
2.2.28	Sp HL High	1341	0.00	327.67	90.00	Spare High Low comparator High percent.
2.2.29	Sp HL Hyst	1342	0.00	327.67	1.00	Spare High Low comparator hysteresis value.
2.2.30	Sp HL Low	1343	0.00	327.67	10.00	Spare High Low comparator low percent.
2.2.31	Sp HL Stpt	1344	0.00	327.67	100.00	Spare High Low comparator default full scale value.
2.2.32	Sp Cmp1_Hyst	1345	0.00	327.67	0.01	First spare comparator block Hysteresis value. Plus or minus around the threshold.
2.2.33	Sp Cmp1_Stpt	1346	-327.67	327.67	0.10	First spare comparator block default setpoint value. Can be used for the input or threshold.
2.2.34	Sp Cmp2_Hyst	1347	0.00	327.67	0.01	Second spare comparator block Hysteresis value. Plus or minus around the threshold.
2.2.35	Sp Cmp2_Stpt	1348	-327.67	327.67	0.10	Second spare comparator block default setpoint value. Can be used for the input or threshold.
2.3	Rates / Times					Menu Name
2.3.1	Accel Time 1	103	0.1	3000.0	10.0	Default acceleration time constant for the speed ramp.
2.3.2	Decel Time 1	104	0.1	3000.0	10.0	Default deceleration time constant for the speed ramp.
2.3.3	Smooth Ratio	500	0.0	10.0	0.1	[W] Smooth ratio for S-curves//0 = linear ramps//100 = full acc/dec inc/dec times.
2.3.4	Fast Stop Tim	503	0.1	3000.0	0.1	Fast stop ramp time
2.3.5	Smooth Ratio 2	501	0.0	10.0	0.0	[W] Smooth ratio 2 for S-curves//0 = linear ramps//100 = full acc/dec inc/dec times.
2.3.6	Run Dec Rate	1269	0.00	320.00	5.00	Speed setpoint block decrease rate in hertz per second
2.3.7	Run Inc Rate	1270	0.00	320.00	5.00	Speed setpoint block increase rate in hertz per second
2.3.8	Slv Rate Lim	1260	0	3200	10	Slave speed rate limit if applicable
2.3.9	Strt 0 Spd Time	615	0	32000	100	After giving the start command the drive will remain in zero speed for the time defined by this parameter. The ramp will be released to follow the set frequency/speed reference after this time is elapsed from the instant where command is given.
2.3.10	Stop 0 Spd Time	616	0	32000	100	The drive will remain at zero speed with controllers active for the time defined by this parameter after reaching the zero speed on giving a stop command.
2.3.11	Freq Ref LP TC	1309	0	1000	0	Frequency reference filter time constant in ms//0 = not in use
2.3.12	Skip Freq Mlt	518	0.1	10.0	0.5	Skip frequency multiplier number. Modifies ramp rates when in the skip frequencies.
2.3.13	Ten Dec Rate	1263	0.00	320.00	5.00	Tension setpoint block decrease rate in percent per second
2.3.14	Ten Inc Rate	1264	0.00	320.00	5.00	Tension setpoint block increase rate in percent per second
2.3.15	Ten Ramp Rate	1271	0	3200	5	Tension ramp rate in % per second

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.3.16	Ten B Rate	1272	0.00	320.00	5.00	Transfer into tension mode rate in % per second
2.3.17	Slack Rate	1310	0	320	10	Speed step ramp rate when enabled in hertz per second
2.3.18	Spd B Rate2	1285	0.00	320.00	5.00	Rate to smoothly transfer out of tension mode in percent per second
2.3.19	Trq Rmp Rate	1290	0	3200	5	Torque reference ramp limit in percent per second.
2.3.20	Sp LP Fil TC	1329	0.00	10.00	0.10	Spare low pass filter time constant. Default to 100 ms.
2.3.21	Sp Bmp Rate1	1333	0.00	20.00	0.00	Spare bumpless block ramp rate to the input 1. % per second.
2.3.22	Sp Bmp Rate2	1334	0.00	20.00	0.00	Spare bumpless block ramp rate to the input 2. % per second.
2.3.23	Sp Dly1 TOFF	1349	0.00	327.67	0.10	First spare timer delay off setting in seconds. Default to 100 ms.
2.3.24	Sp Dly1 TON	1350	0.00	327.67	0.10	First spare timer delay on setting in seconds. Default to 100 ms.
2.3.25	Sp Dly2 TOFF	1351	0.00	327.67	0.10	Second spare timer delay off setting in seconds. Default to 100 ms.
2.3.26	Sp Dly2 TON	1352	0.00	327.67	0.10	Second spare timer delay on setting in seconds. Default to 100 ms.
2.3.27	Spd Cmp Fil TC	0	0.00	10.00	0.10	Spd Comparitor low pas filter. Default to 100 ms.
2.3.28	WD Com Dly	0	0.00	100.00	0.10	Communications watch dog timer delay. Default to 100 ms.
2.3.29	WD Init Dly Tim	0	0.00	327.67	10.00	Power up delay for the communications withdog timer. Default to 10 seconds.
2.3.30	Accel Comp Tc	0	0.002	1.000	0.100	Filtering Time Constant for acceleration compensation in s
2.3.31	Trq Ref Fil TC	0	0.0	1000.0	0.0	Filter time for torque reference (0...10000) = 0...1000.0 ms
2.3.32	Spd Err Fil TC	0	0	1000	0	Filter time for speed error (0 ...1000) = 0...1000 ms
2.3.33	DC Tim Rmp Stp	0	0.00	100.00	0.00	Dc brake time [ms] in ramp stop
2.3.34	DC Tim Cst Stp	0	0.00	100.00	0.00	Dc brake time [ms] in coast stop
2.3.35	ST Accel Tim	1236	0	32765	50	Time for the fast accel stop tape Value x 2 ms.
2.3.36	ST Accel Fast	1232	0.0	3200.0	2.0	Stop tape fast accel time. Time is from zero to max frequency.
2.3.37	ST Accel Slow	1233	0.0	3200.0	5.0	Stop tape slow accel time. Time is from zero to max frequency.
2.3.38	ST Delay Count	1234	0	32765	1024	Number of encoder pulses to delay firing the stop fingers.
2.3.39	ST DecelTim	1235	0	32765	50	Time for the fast decel in stop tape. Value x 2 ms.
2.3.40	ST Decel Fast	1231	0.0	3200.0	2.0	Stop tape fast decel time. Time is from zero to max frequency.
2.3.41	ST Decel Slow	1230	0.0	3200.0	5.0	Stop tape slow decel time. Time is from zero to max frequency.
2.4	Tuning Gains					Menu Name
2.4.1	Speed Control Kp	613	1	1000	30	Gain for the speed controller. (% / Hz)
2.4.2	Speed Control Ti	614	0.0	500.0	30.0	Integral time constant for the speed controller
2.4.3	Spd Cntrl F0	0	0.00	320.00	0.00	Corner frequency for SpeedControl_Kp_f0
2.4.4	Spd Cntrl F1	0	0.00	320.00	0.00	Corner frequency for SpeedControl_Kp
2.4.5	Spd Cntrl Kp F0	0	0	300	100	Relative gain (%) below SpeedControl_f0
2.4.6	Spd Cntrl Kp FW	0	0	300	100	Relative final gain for Speed controller p-gain at field weakening in%/< 100 reduces gain, >100 increases gain above FWP
2.4.7	Spd Cntrl Kp T0	0	0	300	100	Relative gain (%) if torque is below SpeedControl_T0
2.4.8	Spd Cntrl T0	0	0	300	0	Torque Limit for reduced SpeedControl_Kp (1000 = minimal)
2.4.9	Accel.Compens.	626	0.00	300.00	0.00	Inertia compensation to improve speed response during acceleration and deceleration. Time is defined as acceleration time to nominal speed with nominal torque. This parameter is active also in advanced openloop.
2.4.10	Spd Err Bnd Frq	0	0.0	450.0	0.0	Speed Error Notch filter BandStop frequency (10...4500) = 1.0 ... 450.0 Hz//0 = Not in Use
2.4.11	Spd Err LP Freq	0	1.0	250.0	100.0	Speed Error LowPass filter cutoff frequency (10...2500) = 1.0 ... 250.0 Hz//0 = Not in Use
2.4.12	LoadDrooping	620	0.00	100.00	0.00	The drooping function enables speed drop as a function of load. The amount of allowed speed drop is proportional to the load or speed controller output (Iq reference). That amount corresponding to 100% load of the motor is set using this parameter.
2.4.13	CurrentControlKp	617	0.00	100.00	40.00	Gain for the current controller. This controller is active only in closed loop and advanced open loop. It generates the voltage vector reference to the modulator.
2.4.14	Curr Cntrl Ti	0	0.0	100.0	1.5	Current controller integrator time constant (0 ... 1000) = 0...100.0 ms
2.4.15	Ten P Gain	1278	0.000	32.767	0.010	Tension loop proportional gain.
2.4.16	Ten I Gain	1279	0.00	327.67	1.00	Tension loop integral time constant.
2.4.17	Ten PI Gn Scale	1282	1	32767	1	Modifies the error which results in P and I gain change.
2.4.18	OV Reg Kp	0	0	32767	2000	P-gain of over voltage controller (0 ...32767)
2.4.19	OV Reg Ki	0	0	32767	500	I-gain of over voltage controller (0 ...32767)
2.4.20	OV Reg Kd	0	0	32767	400	D-gain of over voltage controller OL, 256 equals 1.0 (0 .. 32767)
2.4.21	UV Reg Kp	0	0	32767	4000	P-gain of under voltage controller (0 ...32767)
2.4.23	UV Reg Kd	0	0	32767	0	D-gain of under voltage controller

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.4.24	Mtr I Lim Ki	0	0	32767	400	I-gain of motor side over current controller (0 ... 32767)
2.4.25	Mtr I Lim Kp	0	0	32767	20000	P-gain of motor side over current controller (0 ... 32767)
2.4.26	Gen I Lim Ki	0	0	32767	400	I-gain of generator side over current controller (0 ... 32767)
2.4.27	Gen I Lim Kp	0	0	32767	20000	P-gain of generator side over current controller (0 ... 32767)
2.4.28	Trq Lim Kp	610	0	32000	3000	P-gain of torque limit controller
2.4.29	Trq Lim Ki	611	0	32000	200	I-gain of torque limit controller
2.4.30	Spd Cont Kp	637	0	32767	3000	[W] P-gain of open loop speed controller (0...32767). Init := 3000
2.4.31	Spd Cont Ki	638	0	32767	300	[W] I-gain of open loop speed controller (0 ... 32767). Init := 300
2.4.32	Trq Cntrl Kp	639	0	32000	150	P-gain of torque controller
2.4.33	Trq Cntrl Ki	640	0	32000	10	I-gain of torque controller
2.4.34	Cl Ovr Vlt Kp	0	0	5000	50	CL OverVoltage Controller base gain
2.4.35	Cl Ovr Vlt Ti	0	0	500	15	CL OverVoltage Controller integral time in ms
2.5	Limits					Menu Name
2.5.1	Freq Max	102	FreqMin	320.00	60.00	[W] Max output frequency, f[Hz] = FreqMin/FreqScale//Range[FreqMin...32767]//If FreqScale=100 then 5000 equals 50.00 Hz. Init := 5000
2.5.2	Min Frequency	101	0.00	Max_Frequency	0.00	Minimum frequency the speed reference is allowed to go down to in hertz.
2.5.3	Mtr Cur Limit	1291	0.00	300.00	100.00	Motor current limit value
2.5.4	Motoring Trq Lim	1305	0.0	300.0	300.0	Torque limit for motor side torque limiter,1000 equals 100% nominal torque
2.5.5	Gener Trq Lim	1306	0.0	300.0	300.0	Torque limit for generator side torque limiter,1000 equals 100% nominal torque
2.5.6	Trq Lim FWD	1307	0.0	300.0	300.0	Additional Torque limit for Forward Reference Direction,1000 equals 100% nominal torque
2.5.7	Trq Lim REV	1308	0.0	300.0	300.0	Additional Torque limit for Reverse Reference Direction,1000 equals 100% nominal torque
2.5.8	Max Run Stpt	1267	-320.00	320.00	60.00	Speed setpoint block increase allowed limit.
2.5.9	Min Run Stpt	1268	-320.00	320.00	-60.00	Speed setpoint block decrease allowed limit.
2.5.10	Max RPM	1248	0	32767	1800	MAX RPM for overspeed detection.
2.5.11	Ovr Spd Stp	1258	0.00	327.67	110.00	Overspeed setpoint in percentage of max speed. Default to 110%
2.5.12	Zero Detect	1259	0.00	200.00	2.00	Speed feedback comparator At zero speed setpoint. Default to 2% of max speed.
2.5.13	Spd Hyst	0	0.00	200.00	1.00	Speed feedback comparator hysteresis value. Default to 1%
2.5.14	Spd Decimal	0	0	4	2	Speed feedback comparator decimal point resolution. Default to 2.
2.5.15	Max Tension	1286	0.00	327.67	100.00	Tension setpoint for feedback out of range comparator
2.5.16	Ten Stpt Max	1265	-327.67	327.67	100.00	Tension setpoint block increase allowed limit.
2.5.17	Ten Stpt Min	1266	-327.67	327.67	0.00	Tension setpoint block decrease allowed limit.
2.5.18	Ten Max Lmt	1280	-327.67	327.67	10.00	Tension PI Out max limit.
2.5.19	Ten Min Lmt	1281	-327.67	327.67	-10.00	Tension PI min limit.
2.5.20	Max Ten Set	1289	0.00	320.00	90.00	Tension feedback High/Low comparator High setpoint.
2.5.21	Min Ten Set	1288	0.00	320.00	10.00	Tension feedback High/Low comparator Low setpoint.
2.5.22	Max Ten Hys	1287	0.00	320.00	5.00	Tension feedback High/Low comparator hysteresis value.
2.5.23	Ten HL Decimal	0	0	2	2	Number of decimal places for the input values. Needed to perform the correct percentage division.
2.5.24	Trq Ref Max	1250	-300.0	300.0	100.0	Maximum limit for the torque reference. Entered in percent torque.
2.5.25	Trq Ref Min	1249	-300.0	300.0	0.0	Minimum limit for the torque reference. Entered in percent torque.
2.5.26	Torque Speed Limit	644	0	1	1 / Freq Ref	Torque control max frequency 0 = Max Frequency Par 2.1.1, 1 = Selected frequency reference, 2 = Preset speed 7
2.5.27	Trq Ref Hyst	0	-3000	3000	0	Hysteresis for TorqueReference before filtering (-3000...3000) = -300...300%
2.5.28	Trq Ref DeadZone	0	-300.0	300.0	0.0	Dead zone for TorqueReference before hysteresis (-3000...3000) = -300...300%
2.5.29	Pos Freq Limit	1300	-320.00	320.00	60.00	Additional signed Upper Frequency limit in FreqScale, Used while in torque mode to control overspeed.//Range [-32767..32767]//0 prevents running to forward direction
2.5.30	Neg Freq Limit	1301	-320.00	320.00	-60.00	Additional signed lower Frequency limit in FreqScale, Used while in torque mode to control overspeed.//Range [-32767..32767]//0 prevents running to forward directionAdditional signed Lower Frequency limit in FreqScale,//Range [-32767..32767]//0 prevents running to reverse direction
2.5.31	Win Pos Width	0	0.00	320.00	6.00	Frequency Window width for positive direction in FreqScale, activated with TCSpeedLimiterMode=4

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.5.32	Win Neg Width	0	0.00	320.00	6.00	Frequency Window width for negative direction in FreqScale, activated with TCSpeedLimiterMode=4.
2.5.33	Cl Ovr Mtr Lim	0	0.0	500.0	10.0	CL Motoring current limit (1000 = 100.0%) for OverVoltage Controller
2.5.34	Sp Lim Max	1353	-327.67	327.67	100.00	Spare limit block maximum value.
2.5.35	Sp Lim Min	1354	-327.67	327.67	-100.00	Spare limit block minimum value.
2.6	Scaling					Menu Name
2.6.1	LS to Freq	0	-32.767	32.767	0.600	Scaling factor to convert speed reference units (usually %) to motor units (Usually motor Hz)
2.6.2	LS Scl Div	0	-32767	32767	1000	Scaling factor to convert speed reference units (usually %) to motor units (Usually motor Hz)
2.6.3	Slack Div	0	0	32767	100	Divide point for the slack multiply block
2.6.4	Sp Tbl0 Gn	1320	-327.67	327.67	1.00	Divide value for spare table block 0.
2.6.5	Sp Tbl1 Gn	1321	-327.67	327.67	1.00	Divide value for spare table block 1.
2.6.6	Sp Tbl2 Gn	1322	-327.67	327.67	1.00	Divide value for spare table block 2.
2.6.7	Sp MD1 Dv	1323	-327.67	327.67	1.00	Default value for the first spare MULDIV block divide input.
2.6.8	Sp MD1 Mlt	1324	-327.67	327.67	1.00	Default value for the first spare MULDIV block multiply input.
2.6.9	Sp MD2 Dv	1325	-327.67	327.67	1.00	Default value for the second spare MULDIV block divide input.
2.6.10	Sp MD2 Mlt	1326	-327.67	327.67	1.00	Default value for the second spare MULDIV block multiply input.
2.6.11	Sp Add Val	1327	-327.67	327.67	0.00	Spare add block optional cal number.
2.6.12	Sp Sub Val	1328	-327.67	327.67	0.00	Spare sub block optional scaling value.
2.6.13	Sp LH Decimal	0	0	2	2	Number of decimal places for the input values. Needed to perform the correct percentage division.
2.6.14	Trq Ref Off	1298	-3200.0	3200.0	0.0	Offset for TorqueReference (-32000...32000)
2.6.15	Trq Ref Gn	1299	-320.00	320.00	10.00	Gain for TorqueReference, Divided by 1000 for end gain././(-32000..32000), nom = 1000
2.6.16	Trq RefB MSt	1304	-327.67	327.67	1.00	Used to scale the second torque reference input for load sharing.
2.6.17	Trq RefB Div	0	-327.67	327.67	1.00	Denominator for the scaling of the second torque reference input.
2.6.18	Ratio Div	0	1	10000	100	Used to scale the ratio draw to usable units. Default = 100
2.7	Bit Config					Menu Name
2.7.1	Run Input	0	0	2000	1011	enables the drive in run mode. Default to the first digital input
2.7.2	Thread Input	0	0	2000	1002	Enables the drive at the thread speed. Default to zero bit.
2.7.3	Jog F Input	0	0	2000	1012	Enables jog forward in the drive. Default to second digital input
2.7.4	Jog R Input	0	0	2000	1002	Enables the jog reverse function in the drive. Default to zero bit.
2.7.5	Reverse Inp	0	0	2000	1002	Negates the speed reference. Default to zero bit.
2.7.6	Ramp Hold	0	0	2000	1002	Holds the speed reference at its current setpoint when active.
2.7.7	Stop Input	0	0	2000	1001	Stop input used for 3 wire control. Stops drive when it goes low. Default to one bit.
2.7.8	Fast Stop	0	0	2000	1001	Initiates a stop and switches in faster ramp rates when input goes low. Default to one bit.
2.7.9	Coast Stop	0	0	2000	1001	Set to input for emergency coast stop. Default to one bit.
2.7.10	At Zero Time	0	0	2000	1127	Rests the Drive OK after a fault. Default to At Zero Spd
2.7.11	DC Brk Cmd	0	0	2000	1002	Enables DC injection braking after stop. Default to Zero Bit
2.7.12	Run Stpt Res	0	0	2000	1099	Spd stpt inc dec reset input. Default to zero bit
2.7.13	Run Stpt Inc Inp	0	0	2000	1002	Inc input. Default to zero bit
2.7.14	Run Stpt Dec Inp	0	0	2000	1002	Spd stpt dec input. Default to zero bit
2.7.15	Slv No Ramp	0	0	2000	1001	Disables the slave speed ramp
2.7.16	Disable Ramp	0	0	2000	1002	Disable speed reference ramp function
2.7.17	Slk No Ramp	0	0	2000	1001	Disables the rate limit on the speed step inputs. Default to disable
2.7.18	Step Reverse	0	0	2000	1002	Inverts the speed step references when set.
2.7.19	Sup Enable	0	0	2000	1002	Enables the speed slack up setpoint.
2.7.20	Sout Enable	0	0	2000	1002	Enables the slack out speed setpoint reference
2.7.21	Ten Stall En	0	0	2000	1002	Enables stall reference. Default to zero bit
2.7.22	Ten Bal Set	0	0	2000	1001	Toggles the balance set block. Default to one bit.
2.7.23	Ten Stpt Dec	0	0	2000	1002	Decrease tension setpoint bit. Default zero bit.
2.7.24	Ten Stpt Inc	0	0	2000	1002	Increase tension setpoint bit. Default zero bit.
2.7.25	Ten Stpt Res	0	0	2000	1002	Tension Inc/Dec reset bit. Default to zero bit.
2.7.26	Ten Rmp Res	0	0	2000	1002	Tension ramp reset bit. Default to zero bit
2.7.27	Ten B Sw	0	0	2000	1001	Switch into tension bumpless block input. Default to one bit.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.7.28	Ten I Res 1	0	0	2000	1099	First reset Tension loop input bit. Default to Cntrl Inhib
2.7.29	Ten I Res 2	0	0	2000	1001	Second reset Tension loop input bit. . Default to One Bit to turn it off unless needed.
2.7.30	Ten I Res 3	0	0	2000	1105	Third reset Tension loop input bit. . Default to Ten At Max.
2.7.31	Ten I Res 4	0	0	2000	1106	Fourth reset Tension loop input bit. Default to Ten At Min.
2.7.32	Ten PI Hold	0	0	2000	1002	Holds the Tension loop PI regulator
2.7.33	Ten Sout En	0	0	2000	1105	Tension slack out enable. Default to Ten At Max
2.7.34	Ten Sup En	0	0	2000	1106	Enables the tension slack up. Default to Ten At Min.
2.7.35	Spd Bump Sw	0	0	2000	1002	Enables the output of the tension loop. Default to zero bit.
2.7.36	Ten Rev Pol	0	0	2000	1002	Inverts the output of the tension loop when enabled.
2.7.37	Trq Ref En	0	0	2000	1090	Enables teh torque reference. Default to RunRequest
2.7.38	Trq Dir	0	0	2000	1002	Reverse the polarity of the torque reference. Default to Zero bit
2.7.39	Trq No Ramp	0	0	2000	1001	Disables the torque reference ramp. Defaults to disable the ramp.
2.7.40	Thermistor Inp	0	0	2000	1002	Input for thermistor fault. Default to zero Bit.
2.7.41	Sp Sum1 EnA	0	0	2000	1002	Enables the first spare sum input. Default to Zero bit.
2.7.42	Sp Sum1 EnB	0	0	2000	1002	Enables the second spare sum input. Default to Zero bit.
2.7.43	Sp Sum1 EnC	0	0	2000	1002	Enables the third spare sum input. Default to Zero bit.
2.7.44	Sp Bmp Hold	0	0	2000	1002	Holds the output of the spare bumpless block when enabled. Default to Zero Bit
2.7.45	Sp Bmp Sw	0	0	2000	1002	Switches inputs of the spare bumpless block. Default to Zero Bit
2.7.46	Sp Sel1 En1	0	0	2000	1002	First spare select block enables input 1 configuration point.
2.7.47	Sp Sel2 En1	0	0	2000	1002	Second Spare select block enables input 1 configuration point.
2.7.48	Sp Dly1 In	0	0	2000	1002	First delay block input. Default to Zero Bit
2.7.49	Sp Dly2 In	0	0	2000	1002	Second delay block input. Default to Zero Bit
2.7.50	Sp Ltch1 H1	0	0	2000	1001	First spare latch block first hold bit. Default to One bit.
2.7.51	Sp Ltch1 H2	0	0	2000	1001	First spare latch block second hold bit. Default to One bit.
2.7.52	Sp Ltch1 L	0	0	2000	1002	First spare latch block latch input bit. Default to Zero bit.
2.7.53	Sp Ltch2 H1	0	0	2000	1001	Second spare latch block first hold bit. Default to One bit.
2.7.54	Sp Ltch2 H2	0	0	2000	1001	Second spare latch block second hold bit. Default to One bit.
2.7.55	Sp Ltch2 L	0	0	2000	1002	Second spare latch block latch input bit. Default to Zero bit.
2.7.56	Sp Ltch3 H1	0	0	2000	1001	Third spare latch block first hold bit. Default to One bit.
2.7.57	Sp Ltch3 H2	0	0	2000	1001	Third spare latch block second hold bit. Default to One bit.
2.7.58	Sp Ltch3 L	0	0	2000	1002	Third spare latch block latch input bit. Default to Zero bit.
2.7.59	Sp Inv1 In	0	0	2000	1002	First spare Bit invert blocks input bit.
2.7.60	Sp Inv2 In	0	0	2000	1002	Second spare Bit invert blocks input bit.
2.7.61	Sp Inv3 In	0	0	2000	1002	Third spare Bit invert blocks input bit.
2.7.62	Sp And1 In1	0	0	2000	1002	First spare And block input 1. Default to Zero Bit.
2.7.63	Sp And1 In2	0	0	2000	1002	First spare And block input 2. Default to Zero Bit.
2.7.64	Sp And1 NIn3	0	0	2000	1002	First spare And block inverted input 3. Default to Zero Bit.
2.7.65	Sp And2 In1	0	0	2000	1002	Second spareAnd block input 1. Default to Zero Bit.
2.7.66	Sp And2 In2	0	0	2000	1002	Second spare and block input 2. Default to Zero Bit.
2.7.67	Sp And2 NIn3	0	0	2000	1002	Second spare And block inverted input 3. Default to Zero Bit.
2.7.68	Sp And3 In1	0	0	2000	1002	Third spare And block input 1. Default to Zero Bit.
2.7.69	Sp And3 In2	0	0	2000	1002	Third spare And block input 2. Default to Zero Bit.
2.7.70	Sp And3 NIn3	0	0	2000	1002	Third spare And block inverted input 3. Default to Zero Bit.
2.7.71	Sp Or1 In1	0	0	2000	1002	First spare Or block input 1. Default to Zero Bit.
2.7.72	Sp Or1 In2	0	0	2000	1002	First spare Or block input 2. Default to Zero Bit.
2.7.73	Sp Or1 NIn3	0	0	2000	1002	First spare Or block inverted input 3. Default to Zero Bit.
2.7.74	Sp Or2 In1	0	0	2000	1002	Second spareOr block input 1. Default to Zero Bit.
2.7.75	Sp Or2 In2	0	0	2000	1002	Second spareOr block input 2. Default to Zero Bit.
2.7.76	Sp Or2 NIn3	0	0	2000	1002	Second spare Or block inverted input 3. Default to Zero Bit.
2.7.77	Sp Or3 In1	0	0	2000	1002	Third spare Or block input 1. Default to Zero Bit.
2.7.78	Sp Or3 In2	0	0	2000	1002	Third spareOr block input 2. Default to Zero Bit.
2.7.79	Sp Or3 NIn3	0	0	2000	1002	Third spare Or block inverted input 3. Default to Zero Bit.
2.7.80	Watchdog In	0	0	2000	1002	Communications watchdog timer input from PLC. Default to Zero Bit.
2.7.81	En Trq RefA	0	0	2000	1002	Enables the first torque reference input. Default to Zero Bit
2.7.82	En Trq RefB	0	0	2000	1002	Enables the second torque reference input. Default to Zero Bit
2.7.83	En Trq RefC	0	0	2000	1002	Enables the third torque reference input. Default to Zero Bit

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.7.84	ST Arm Inp ID	0	0	2000	1002	Stop tape arm input.
2.7.85	ST Edge Inp ID	0	0	2000	1002	Stop tape paper edge input.
2.8	Anlg Config					Menu Name
2.8.1	Master Ref	0	0	2000	1254	Speed ref - Default to Run Speed
2.8.2	Thread Ref	0	0	2000	1255	Thread speed ref. Default to Thread Speed
2.8.3	Jog F Ref	0	0	2000	1256	Jog forward ref. Defaulted to Jog F Speed
2.8.4	Jog R Ref	0	0	2000	1257	Jog Reverse ref. Default to Jog R Speed
2.8.5	Draw Inp	0	0	2000	1251	Draw input. Default to Draw Stpt
2.8.6	Accel Inp	0	0	2000	103	Acceleration rate input. Default to Accel Time 1 parameter.
2.8.7	Decel Time	0	0	2000	104	Deceleration rate input. Default to Decel Time 1 parameter.
2.8.8	Slack Up	0	0	2000	1273	Speed slack up input. Default to Spd Slk Up
2.8.9	Slack Out	0	0	2000	1274	Slack out input. Default to Spd Slk Out
2.8.10	Slack Mult	0	0	2000	1203	Optional multiply input for speed step input. Default = 100
2.8.11	Spd Fdbk	0	0	2000	2	Speed feedback input for over and zero speed comparator.
2.8.12	Ovr Spd Inp	0	0	2000	1248	Overspeed comparator maximum setpoint. Default to Max RPM
2.8.13	Tension Inp	0	0	2000	1262	Tension Ref input. Defaulted to Ten Ref
2.8.14	Ten Stall Inp	0	0	2000	1261	Ten stall inp defaulted to Ten Stall
2.8.15	Tens Fdbk	0	0	2000	1200	Configure to the outer process loop feedback signal. Default to Zero Analog
2.8.16	Ten Preload	0	0	2000	1200	Preload for the Tension loop. Default to Zero analog.
2.8.17	Ten I Inp	0	0	2000	1279	Tension I gain input. Defaulted to Ten I Gain
2.8.18	Ten P Inp	0	0	2000	1278	Tension loop P gain. Default to Ten P Gain
2.8.19	Ten Slck Up	0	0	2000	1283	Tension slack up input. Default to Ten Slk Up
2.8.20	Ten Slck Out	0	0	2000	1284	Tension slack out input. Default to Ten Slk Out
2.8.21	Ten Cmp Stp	0	0	2000	1286	Setpoint input for tension high/low comparator. Default to Max Tension
2.8.22	Mtr Cur Lim Scl	0	0	2000	1291	Scaling value for current limit. Default to MotorCurrentLim.
2.8.23	Sp Tbl0 Inp	0	0	2000	1201	First spare table block input configuration point.
2.8.24	Sp Tbl0 Xin	0	0	2000	1200	First spare table block x axis configuration point. Default to Zero analog
2.8.25	Sp Tbl1 Inp	0	0	2000	1201	Second spare table block input configuration point.
2.8.26	Sp Tbl1 Xin	0	0	2000	1200	Second spare table block x axis configuration point. Default to Zero analog
2.8.27	Sp Tbl2 Inp	0	0	2000	1201	Third spare table block input configuration point.
2.8.28	Sp Tbl2 Xin	0	0	2000	1200	Third spare table block x axis configuration point. Default to Zero analog
2.8.29	Sp MD1 Val	0	0	2000	1200	Input for the first spare MULDIV block. Default to Zero analog.
2.8.30	Sp MD2 Val	0	0	2000	1200	Input for the second spare MULDIV block. Default to Zero analog.
2.8.31	Sp MD1 Div	0	0	2000	1323	First spare MULDIV block divide input. Default to Sp MD1 Dv cal number.
2.8.32	Sp MD1 Mul	0	0	2000	1324	First spare MULDIV block multiply input. Default to Sp MD1 Mlt cal number.
2.8.33	Sp MD2 Div	0	0	2000	1325	Second spare MULDIV block divide input. Default to Sp MD2 Dv cal number.
2.8.34	Sp MD2 Mul	0	0	2000	1326	Second spare MULDIV block multiply input. Default to Sp MD2 Mlt cal number.
2.8.35	Sp Add1 In1	0	0	2000	1327	First input of spare Add block.
2.8.36	Sp Add1 In2	0	0	2000	1327	Second input of spare Add block.
2.8.37	Sp Sub1 In1	0	0	2000	1328	First input of spare Sub block.
2.8.38	Sp Sub1 In2	0	0	2000	1328	Second input of spare Sub block.
2.8.39	Sp LP Fil In	0	0	2000	1200	Input to the spare low pass filter. Default to zero analog.
2.8.40	Sp ABS In	0	0	2000	1200	Spare absolute value block input. Default to Zero Analog
2.8.41	Sp Sum1 InA	0	0	2000	1330	Spare sum block first input. Default to Sp Sum1 StA.
2.8.42	Sp Sum1 InB	0	0	2000	1331	Spare sum block second input. Default to Sp Sum1 StB.
2.8.43	Sp Sum1 InC	0	0	2000	1332	Spare sum block third input. Default to Sp Sum1 StC.
2.8.44	Sp Bmp In1	0	0	2000	1335	First input of the spare bumpless block. Default to Sp Bmp St1.
2.8.45	Sp Bmp In2	0	0	2000	1336	Second input of the spare bumpless block. Default to Sp Bmp St2.
2.8.46	Sp Sel1 In0	0	0	2000	1337	First spare select block input 0. Default to Sp Sel1 ST0
2.8.47	Sp Sel1 In1	0	0	2000	1338	First spare select block input 1. Default to Sp Sel1 ST1
2.8.48	Sp Sel2 In0	0	0	2000	1339	Second spare select block input 0. Default to Sp Sel2 ST0
2.8.49	Sp Sel2 In1	0	0	2000	1340	Second spare select block input 1. Default to Sp Sel2 ST1
2.8.50	Sp HL Inp	0	0	2000	1200	Spare High/Low comparator input value. Default to Zero Analog
2.8.51	Sp HL Setpt	0	0	2000	1344	Spare High/Low comparator setpoint value. Default to Sp HL Stpt
2.8.52	Sp Cmp1 In	0	0	2000	1346	First spare comparator block input parameter to be compared with the threshold. Default to Sp Cmp1 Stpt.
2.8.53	Sp Cmp1 Thres	0	0	2000	1346	First spare comparator block threshold parameter to be compared with the input. Default to Sp Cmp1 Stpt.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.8.54	Sp Cmp2 In	0	0	2000	1348	Second spare comparator block input parameter to be compared with the threshold. Default to Sp Cmp2 Stpt.
2.8.55	Sp Cmp2 Thres	0	0	2000	1348	Second spare comparator block threshold parameter to be compared with the input. Default to Sp Cmp2 Stpt.
2.8.56	Sp Lim Inp	0	0	2000	1200	Spare limit input. default to Zero Analog
2.8.57	Trq Ref	0	0	2000	1302	Torque reference. Default to C Trq Ref StA
2.8.58	Trq RefB	0	0	2000	1303	Second Torque reference input configuration. Default to C Trq Ref StB
2.8.59	Trq RefB Mlt	0	0	2000	1304	Second Torque reference scaling configuration. Default to C Trq RefB_MSt
2.8.60	Trq Ref C	0	0	2000	1303	Third Torque reference input configuration. Default to C Trq Ref StB
2.8.61	Sp WPVal ID	0	0	2000	0	Write param value ID that the data will be sent to. Default to 0 which will not send data.
2.8.62	Sp WPVal2 ID	0	0	2000	0	Write param value ID that the data will be sent to. Default to 0 which will not send data.
2.8.63	Sp WPVal Inp	0	0	2000	1200	Spare Write param value ID number for the parameter to be passed.
2.8.64	Sp WPVal2 Inp	0	0	2000	1200	Spare Write param value ID number for the parameter to be passed.
2.8.65	ST Accel Tim ID	0	0	2000	1236	Stop tape fast accel time input. Default to ST Accel Tim
2.8.66	ST Fast Acc ID	0	0	2000	1232	Stop tape fast accel input. Default to ST Accel Fast
2.8.67	ST Slow Acc ID	0	0	2000	1233	Stop tape slow accel input. Default to ST Accel Slow
2.8.68	ST DeceTim ID	0	0	2000	1235	Stop tape fast decl time input. Default to ST Decel Tim
2.8.69	ST Slow Dec ID	0	0	2000	1230	Stop tape slow decel input. Default to ST Decel Slow
2.8.70	ST Fast Dec ID	0	0	2000	1231	Stop tape fast decel input. Default to ST Decel Fast
2.8.71	ST Cnts Stpt	0	0	2000	1234	Stop tapes count setpoint input. Default to ST Delay Count.
2.8.72	ST Counter ID	0	0	2000	1528	Which counter to use for stop tape delay. Default to Counter 1 ID.
2.9	Enables					Menu Name
2.9.1	Ratio Draw En	0	0	1	1 / Ratio Draw	Ratio or difference draw selection
2.9.2	Run Stpt Up	0	0	1	0 / Disabled	Spd stpt block update input
2.9.3	Skip S Rev	0	0	1	0 / Disabled	Skip S2,S4 scurve when opposite direction asked for during a ramp
2.9.4	Rmp Act Lim	0	0	1	0 / Disabled	Enables ramping during the over ride limits
2.9.5	Fly Strt Flt	0	0	1	1 / Enabled	Enables the ability to start into a spinning motor after a fault
2.9.6	3 Wire St En	0	0	1	0 / Disabled	Enables three wire start stop logic
2.9.7	Start Function	505	0	1	0 / Ramping	Start function. 0 = Ramp, 1 = Flying start
2.9.8	Stop Funct	0	0	3	2 / Ramp+REc oast	Stop function, 0=coasting, 1=framp
2.9.9	Brake Chopper	0	0	8	0 / B(No)T(No)	Brake Chopper Control Mode//0 = Brake NO, Test NO, 1 = Brake EXTERNAL, Test NO, //2 = Brake YES(Ready), Test NO, 3 = Brake YES(Run), Test NO, //4 = Brake YES(Ready), Test YES(Ready), 5 = Brake YES(Run), Test YES(Ready), //6 = Brake YES(Run), Test YES(R
2.9.10	Overvolt Contr	607	0	2	1 / On:NoRam ping	[W] Over votage controller oper. Mode 0=disabled,1=no ramping, 2 = ramping//. Init := 1
2.9.11	UV Contrl	608	0	1	1 / Enabled	[W] Enables under voltage controller, 0= disabled, 1= enabled. Init := 1
2.9.12	Ten Bal Ret	0	0	1	0 / Disabled	Enables the balance block to be retentive
2.9.13	Ten Stpt Up	0	0	1	0 / Disabled	Tension block update enable bit
2.9.14	Mtr I Lim En	0	0	1	1 / Disabled	Enables motor side over current control, 0= disabled, 1= enabled
2.9.15	Gen I Lim En	0	0	1	1 / Disabled	Enables generator side over current control, 0= disabled, 1= enabled
2.9.16	Fault Start En	0	0	1	1 / Enabled	Enable restart of the drive after a fault without toggling run inputs
2.9.17	SC Trq Chain Sel	0	0	4	0 / Not Used	Control word for torque in speed control mode, bits B0 ... B7 //B0=TorqueLim, 0=not in use, 1= TorqueReferenceActual is used as an additional torque limit//B1=TorqueAdd, 0=not in use, 1=TorqueReferenceActual is added to speed control output//B2=Posi

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.9.18	Torq Ref Select	0	0	1	1 / En Trq Ref	Selector for torque reference//0 = not in use//1 = TorqueReference//2 = ExtTorqueReference
2.9.19	Trq Spd Lim Mode	0	0	5	0 / Max Min	Speed Limiter operation mode for torque control//0: NegFreqMax ... PosFreqMax//1: - FreqRampOut ... + FreqRampOut //2: NegFreqMax ... FreqRampOut (MIN)//3: FreqRampOut ... PosFreqMax (MAX)//4: FreqRampOut +-WindowPos/NegWidth//5: 0..FreqRampOut (pos or neg
2.9.20	TC Spd Lim Sel	0	0	255	0	options for speed limit in torque control mode, bits B0 ... B7 //B0=Update Ramp Generator when MotorControlMode changes from TC (4) to SC (3)//B1=SmartRampDown, When speed limit goes down it rapidly goes to actual value//and then goes to a lower value
2.9.21	Cl Ovr Vlt En	0	0	1	0 / Disabled	Enable CL OverVoltage Controller
2.10	I/O					Menu Name
2.10.1	Digital Inputs					Menu Name
2.10.1.1	DIN7 Slot ID	0	0.0	CrossCon_Max	0.0	Configure to the the desired I/O slot and position for the seventh digital input. Default to zero.
2.10.1.2	DIN8 Slot ID	0	0.0	CrossCon_Max	0.0	Configure to the the desired I/O slot and position for the eighth digital input. Default to zero.
2.10.2	Digital Outputs					Menu Name
2.10.2.1	DOUT1 ID	0	0	2000	1116	First digital output configuration point. Default to Drive fault
2.10.2.2	DOUT1 Inv	0	0	1	0 / No	Inverts the first digital output when enabled.
2.10.2.3	DOUT2 ID	0	0	2000	1098	Second digital output configuration point. Default to Drive Running
2.10.2.4	DOUT2 Inv	0	0	1	0 / No	Inverts the second digital output when enabled.
2.10.2.5	DOUT3 ID	0	0	2000	1118	Third digital output configuration point. Default to At zero speed.
2.10.2.6	DOUT3 Inv	0	0	1	0 / No	Inverts the third digital output when enabled.
2.10.2.7	DOUT4 ID	0	0	2000	1002	Fourth digital output configuration point. Default to zero bit
2.10.2.8	DOUT4 Slot ID	0	0.00	CrossCon_Max	0.00	Configure fourth digital output to actual I/O location. Default to no slot. Need additional I/O board.
2.10.2.9	DOUT4 Inv	0	0	1	0 / No	Inverts the fourth digital output when enabled.
2.10.2.10	DOUT5 ID	0	0	2000	1002	Fifth digital output configuration point. Default to zero bit
2.10.2.11	DOUT5 Slot ID	0	0.00	CrossCon_Max	0.00	Configure fifth digital output to actual I/O location. Default to no slot. Need additional I/O board.
2.10.2.12	DOUT5 Inv	0	0	1	0 / No	Inverts the fifth digital output when enabled.
2.10.2.13	DOUT6 ID	0	0	2000	1002	Sixth digital output configuration point. Default to zero bit
2.10.2.14	DOUT6 Slot ID	0	0.00	CrossCon_Max	0.00	Configure sixth digital output to actual I/O location. Default to no slot. Need additional I/O board.
2.10.2.15	DOUT6 Inv	0	0	1	0 / No	Inverts the sixth digital output when enabled.
2.10.3	Analog Inputs					Menu Name
2.10.3.1	AIN1 Gain	0	-100.00	100.00	1.00	Gain. 100 equals multiply by one.
2.10.3.2	AIN1 Off	0	-100.00	100.00	0.00	Offset for analog input
2.10.3.3	AIN1 Tc	0	0.00	5.00	0.10	Low pass filter time constant.
2.10.3.4	AIN2 Gain	0	-100.00	100.00	1.00	Gain. 100 equals multiply by one.
2.10.3.5	AIN2 Off	0	-100.00	100.00	0.00	Offset for analog input
2.10.3.6	AIN2 Tc	0	0.00	5.00	0.10	Low pass filter time constant.
2.10.3.7	AIN3 Slot ID	0	0.000	CrossCon_Max	0.000	Configure to the the desired I/O slot and position for the third analog input. Default to 0. Need additional option boards.
2.10.3.8	AIN3 Gain	0	-100.00	100.00	1.00	Gain. 100 equals multiply by one.
2.10.3.9	AIN3 Off	0	-100.00	100.00	0.00	Offset for analog input
2.10.3.10	AIN3 Tc	0	0.00	5.00	0.10	Low pass filter time constant.
2.10.3.11	AIN4 Slot ID	0	0.000	CrossCon_Max	0.000	Configure to the the desired I/O slot and position for the fourth analog input. Default to 0. Need additional option boards.
2.10.3.12	AIN4 Gain	0	-100.00	100.00	1.00	Gain. 100 equals multiply by one.
2.10.3.13	AIN4 Off	0	-100.00	100.00	0.00	Offset for analog input
2.10.3.14	AIN4 Tc	0	0.00	5.00	0.10	Low pass filter time constant.
2.10.4	Analog Outputs					Menu Name
2.10.4.1	AOUT1 ID	0	0	2000	3	Select value for first analog output. Default to MotorCurrent
2.10.4.2	AOUT1 Zero	0	-327.67	327.67	0.00	Offset for the first analog output.
2.10.4.3	AOUT1 Cal	0	-327.67	327.67	1.00	Multiply for first analog output. 100 equals 1.00
2.10.4.4	AOUT1 TC	0	0.00	5.00	0.10	filter time constant for the first analog out. 100 equals one second.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.10.4.5	AOUT2 ID	0	0	2000	2	Select value for second analog output. Default to MotorSpeed
2.10.4.6	AOUT2 Zero	0	-327.67	327.67	0.00	Offset for the second analog output.
2.10.4.7	AOUT2 Cal	0	-327.67	327.67	1.00	Multiply for second analog output. 100 equals 1.00
2.10.4.8	AOUT2 TC	0	0.00	5.00	0.10	filter time constant for the second analog out. 100 equals one second.
2.10.4.9	AOUT2 Slot ID	0	0	CrossCon_Max	0	Selects which slot and address the second analog out goes to. Default to 0. Need additional option boards.
2.10.4.10	AOUT3 ID	0	0	2000	1200	Select value for third analog output. Default to Zero analog
2.10.4.11	AOUT3 Zero	0	-327.67	327.67	0.00	Offset for the third analog output.
2.10.4.12	AOUT3 Cal	0	-327.67	327.67	1.00	Multiply for third analog output. 100 equals 1.00
2.10.4.13	AOUT3 TC	0	0.00	5.00	0.10	filter time constant for the third analog out. 100 equals one second.
2.10.4.14	AOUT3 Slot ID	0	0	CrossCon_Max	0	Selects which slot and address the third analog out goes to. Default to 0. Need additional option boards.
2.10.4.15	AOUT4 ID	0	0	2000	1200	Select value for fourth analog output. Default to Zero analog
2.10.4.16	AOUT4 Zero	0	-327.67	327.67	0.00	Offset for the fourth analog output.
2.10.4.17	AOUT4 Cal	0	-327.67	327.67	1.00	Multiply for fourth analog output. 100 equals 1.00
2.10.4.18	AOUT4 TC	0	0.00	5.00	0.10	filter time constant for the fourth analog out. 100 equals one second.
2.10.4.19	AOUT4 Slot ID	0	0	CrossCon_Max	0	Selects which slot and address the fourth analog out goes to. Default to 0. Need additional option boards.
2.10.5	Encoders					Menu Name
2.10.5.1	Enc1 Slot ID	0	0.000	CrossCon_Max	0.000	First encoder slot ID. Default to not present.
2.10.5.2	Enc2 Slot ID	0	0.000	CrossCon_Max	0.000	Second encoder slot ID. Default to not present.
2.10.5.3	Enc1 Mlt	0	0.000	32.767	1.000	First encoder scaling multiply value. Used with Enc1_Div
2.10.5.4	Enc1 Div	0	0	32767	1000	First encoder scaling divide value. Used with Enc1_Mlt
2.10.5.5	Enc1 Tc	0	0.00	10.00	0.01	First encoder low pass filter time constant. Default to 10 ms.
2.10.5.6	Enc2 Mlt	0	0.000	32.767	1.000	Second encoder scaling multiply value. Used with Enc2_Div
2.10.5.7	Enc2 Div	0	0	32767	1000	Second encoder scaling divide value. Used with Enc2_Mlt
2.10.5.8	Enc2 Tc	0	0.00	10.00	0.01	Second encoder low pass filter time constant. Default to 10 ms.
2.10.5.9	C_Enc2_Add	0	-327.67	327.67	0.00	Offset for the second encoder input.
2.10.5.10	Counter1 Dec	1294	1	10000	1	Divide number for the first counter scaling. Should be power of tens.
2.10.5.11	Counter1 Mult	1295	0	30000	1	Gain factor for first coutner. Used with Counter1 Dec .
2.10.5.12	Counter1 Hld	0	0	2000	1002	Holds the first counter when high
2.10.5.13	Counter1 Res	0	0	2000	1002	Resets the f first counter when high
2.10.5.14	Counter1	0	0	1	0 / Disabled	Enables the first footage counter
2.10.5.15	Counter2 Dec	1296	1	10000	1	Divide number for the second counter scaling. Should be power of tens.
2.10.5.16	Counter2 Mult	1297	0	30000	1	Gain factor for second counter. Used with Counter2 Dec .
2.10.5.17	Counter2 Hld	0	0	2000	1002	Holds the second counter when high
2.10.5.18	Counter2 Res	0	0	2000	1002	Resets the f second counter when high
2.10.5.19	Counter2	0	0	1	0 / Disabled	Enables the second footage counter
2.10.5.20	Encoder1FiltTime	618	0.0	100.0	0.0	Filter time constant for speed measurement.
2.10.6	PT100s					Menu Name
2.11	Tables					Menu Name
2.11.1	Table0					Menu Name
2.11.1.1	T0_X0	1700	-327.67	327.67	-1.00	Table 0 - X0 - Value. See table block descr for details.
2.11.1.2	T0_X1	1701	-327.67	327.67	-0.90	Table 0 - X1 - Value. See table block descr for details.
2.11.1.3	T0_X2	1702	-327.67	327.67	-0.75	Table 0 - X2 - Value. See table block descr for details.
2.11.1.4	T0_X3	1703	-327.67	327.67	-0.60	Table 0 - X3 - Value. See table block descr for details.
2.11.1.5	T0_X4	1704	-327.67	327.67	-0.45	Table 0 - X4 - Value. See table block descr for details.
2.11.1.6	T0_X5	1705	-327.67	327.67	-0.30	Table 0 - X5 - Value. See table block descr for details.
2.11.1.7	T0_X6	1706	-327.67	327.67	-0.15	Table 0 - X6 - Value. See table block descr for details.
2.11.1.8	T0_X7	1707	-327.67	327.67	0.00	Table 0 - X7 - Value. See table block descr for details.
2.11.1.9	T0_X8	1708	-327.67	327.67	0.15	Table 0 - X8 - Value. See table block descr for details.
2.11.1.10	T0_X9	1709	-327.67	327.67	0.30	Table 0 - X9 - Value. See table block descr for details.
2.11.1.11	T0_X10	1710	-327.67	327.67	0.45	Table 0 - X10 - Value. See table block descr for details.
2.11.1.12	T0_X11	1711	-327.67	327.67	0.60	Table 0 - X11 - Value. See table block descr for details.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.11.1.13	T0_X12	1712	-327.67	327.67	0.75	Table 0 - X12 - Value. See table block descr for details.
2.11.1.14	T0_X13	1713	-327.67	327.67	0.90	Table 0 - X13 - Value. See table block descr for details.
2.11.1.15	T0_X14	1714	-327.67	327.67	1.00	Table 0 - X14 - Value. See table block descr for details.
2.11.1.16	T0_X15	1715	-327.67	327.67	1.00	Table 0 - X15 - Value. See table block descr for details.
2.11.1.17	T0_Y0	1716	-327.67	327.67	0.01	Table 0 - Y0 - Value. See table block descr for details.
2.11.1.18	T0_Y1	1717	-327.67	327.67	0.01	Table 0 - Y1 - Value. See table block descr for details.
2.11.1.19	T0_Y2	1718	-327.67	327.67	0.01	Table 0 - Y2 - Value. See table block descr for details.
2.11.1.20	T0_Y3	1719	-327.67	327.67	0.01	Table 0 - Y3 - Value. See table block descr for details.
2.11.1.21	T0_Y4	1720	-327.67	327.67	0.01	Table 0 - Y4 - Value. See table block descr for details.
2.11.1.22	T0_Y5	1721	-327.67	327.67	0.01	Table 0 - Y5 - Value. See table block descr for details.
2.11.1.23	T0_Y6	1722	-327.67	327.67	0.01	Table 0 - Y6 - Value. See table block descr for details.
2.11.1.24	T0_Y7	1723	-327.67	327.67	0.01	Table 0 - Y7 - Value. See table block descr for details.
2.11.1.25	T0_Y8	1724	-327.67	327.67	0.01	Table 0 - Y8 - Value. See table block descr for details.
2.11.1.26	T0_Y9	1725	-327.67	327.67	0.01	Table 0 - Y9 - Value. See table block descr for details.
2.11.1.27	T0_Y10	1726	-327.67	327.67	0.01	Table 0 - Y10 - Value. See table block descr for details.
2.11.1.28	T0_Y11	1727	-327.67	327.67	0.01	Table 0 - Y11 - Value. See table block descr for details.
2.11.1.29	T0_Y12	1728	-327.67	327.67	0.01	Table 0 - Y12 - Value. See table block descr for details.
2.11.1.30	T0_Y13	1729	-327.67	327.67	0.01	Table 0 - Y13 - Value. See table block descr for details.
2.11.1.31	T0_Y14	1730	-327.67	327.67	0.01	Table 0 - Y14 - Value. See table block descr for details.
2.11.1.32	T0_Y15	1731	-327.67	327.67	0.01	Table 0 - Y15 - Value. See table block descr for details.
2.11.2	Table1					Menu Name
2.11.2.1	T1_X0	1732	-327.67	327.67	-1.00	Table 1 - X0 - Value. See table block descr for details.
2.11.2.2	T1_X1	1733	-327.67	327.67	-0.90	Table 1 - X1 - Value. See table block descr for details.
2.11.2.3	T1_X2	1734	-327.67	327.67	-0.75	Table 1 - X2 - Value. See table block descr for details.
2.11.2.4	T1_X3	1735	-327.67	327.67	-0.60	Table 1 - X3 - Value. See table block descr for details.
2.11.2.5	T1_X4	1736	-327.67	327.67	-0.45	Table 1 - X4 - Value. See table block descr for details.
2.11.2.6	T1_X5	1737	-327.67	327.67	-0.30	Table 1 - X5 - Value. See table block descr for details.
2.11.2.7	T1_X6	1738	-327.67	327.67	-0.15	Table 1 - X6 - Value. See table block descr for details.
2.11.2.8	T1_X7	1739	-327.67	327.67	0.00	Table 1 - X7 - Value. See table block descr for details.
2.11.2.9	T1_X8	1740	-327.67	327.67	0.15	Table 1 - X8 - Value. See table block descr for details.
2.11.2.10	T1_X9	1741	-327.67	327.67	0.30	Table 1 - X9 - Value. See table block descr for details.
2.11.2.11	T1_X10	1742	-327.67	327.67	0.45	Table 1 - X10 - Value. See table block descr for details.
2.11.2.12	T1_X11	1743	-327.67	327.67	0.60	Table 1 - X11 - Value. See table block descr for details.
2.11.2.13	T1_X12	1744	-327.67	327.67	0.75	Table 1 - X12 - Value. See table block descr for details.
2.11.2.14	T1_X13	1745	-327.67	327.67	0.90	Table 1 - X13 - Value. See table block descr for details.
2.11.2.15	T1_X14	1746	-327.67	327.67	1.00	Table 1 - X14 - Value. See table block descr for details.
2.11.2.16	T1_X15	1747	-327.67	327.67	1.00	Table 1 - X15 - Value. See table block descr for details.
2.11.2.17	T1_Y0	1748	-327.67	327.67	0.01	Table 1 - Y0 - Value. See table block descr for details.
2.11.2.18	T1_Y1	1749	-327.67	327.67	0.01	Table 1 - Y1 - Value. See table block descr for details.
2.11.2.19	T1_Y2	1750	-327.67	327.67	0.01	Table 1 - Y2 - Value. See table block descr for details.
2.11.2.20	T1_Y3	1751	-327.67	327.67	0.01	Table 1 - Y3 - Value. See table block descr for details.
2.11.2.21	T1_Y4	1752	-327.67	327.67	0.01	Table 1 - Y4 - Value. See table block descr for details.
2.11.2.22	T1_Y5	1753	-327.67	327.67	0.01	Table 1 - Y5 - Value. See table block descr for details.
2.11.2.23	T1_Y6	1754	-327.67	327.67	0.01	Table 1 - Y6 - Value. See table block descr for details.
2.11.2.24	T1_Y7	1755	-327.67	327.67	0.01	Table 1 - Y7 - Value. See table block descr for details.
2.11.2.25	T1_Y8	1756	-327.67	327.67	0.01	Table 1 - Y8 - Value. See table block descr for details.
2.11.2.26	T1_Y9	1757	-327.67	327.67	0.01	Table 1 - Y9 - Value. See table block descr for details.
2.11.2.27	T1_Y10	1758	-327.67	327.67	0.01	Table 1 - Y10 - Value. See table block descr for details.
2.11.2.28	T1_Y11	1759	-327.67	327.67	0.01	Table 1 - Y11 - Value. See table block descr for details.
2.11.2.29	T1_Y12	1760	-327.67	327.67	0.01	Table 1 - Y12 - Value. See table block descr for details.
2.11.2.30	T1_Y13	1761	-327.67	327.67	0.01	Table 1 - Y13 - Value. See table block descr for details.
2.11.2.31	T1_Y14	1762	-327.67	327.67	0.01	Table 1 - Y14 - Value. See table block descr for details.
2.11.2.32	T1_Y15	1763	-327.67	327.67	0.01	Table 1 - Y15 - Value. See table block descr for details.
2.11.3	Table2					Menu Name
2.11.3.1	T2_X0	1764	-327.67	327.67	-1.00	Table 2 - X0 - Value. See table block descr for details.
2.11.3.2	T2_X1	1765	-327.67	327.67	-0.90	Table 2 - X1 - Value. See table block descr for details.
2.11.3.3	T2_X2	1766	-327.67	327.67	-0.75	Table 2 - X2 - Value. See table block descr for details.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.11.3.4	T2_X3	1767	-327.67	327.67	-0.60	Table 2 - X3 - Value. See table block descr for details.
2.11.3.5	T2_X4	1768	-327.67	327.67	-0.45	Table 2 - X4 - Value. See table block descr for details.
2.11.3.6	T2_X5	1769	-327.67	327.67	-0.30	Table 2 - X5 - Value. See table block descr for details.
2.11.3.7	T2_X6	1770	-327.67	327.67	-0.15	Table 2 - X6 - Value. See table block descr for details.
2.11.3.8	T2_X7	1771	-327.67	327.67	0.00	Table 2 - X7 - Value. See table block descr for details.
2.11.3.9	T2_X8	1772	-327.67	327.67	0.15	Table 2 - X8 - Value. See table block descr for details.
2.11.3.10	T2_X9	1773	-327.67	327.67	0.30	Table 2 - X9 - Value. See table block descr for details.
2.11.3.11	T2_X10	1774	-327.67	327.67	0.45	Table 2 - X10 - Value. See table block descr for details.
2.11.3.12	T2_X11	1775	-327.67	327.67	0.60	Table 2 - X11 - Value. See table block descr for details.
2.11.3.13	T2_X12	1776	-327.67	327.67	0.75	Table 2 - X12 - Value. See table block descr for details.
2.11.3.14	T2_X13	1777	-327.67	327.67	0.90	Table 2 - X13 - Value. See table block descr for details.
2.11.3.15	T2_X14	1778	-327.67	327.67	1.00	Table 2 - X14 - Value. See table block descr for details.
2.11.3.16	T2_X15	1779	-327.67	327.67	1.00	Table 2 - X15 - Value. See table block descr for details.
2.11.3.17	T2_Y0	1780	-327.67	327.67	0.01	Table 2 - Y0 - Value. See table block descr for details.
2.11.3.18	T2_Y1	1781	-327.67	327.67	0.01	Table 2 - Y1 - Value. See table block descr for details.
2.11.3.19	T2_Y2	1782	-327.67	327.67	0.01	Table 2 - Y2 - Value. See table block descr for details.
2.11.3.20	T2_Y3	1783	-327.67	327.67	0.01	Table 2 - Y3 - Value. See table block descr for details.
2.11.3.21	T2_Y4	1784	-327.67	327.67	0.01	Table 2 - Y4 - Value. See table block descr for details.
2.11.3.22	T2_Y5	1785	-327.67	327.67	0.01	Table 2 - Y5 - Value. See table block descr for details.
2.11.3.23	T2_Y6	1786	-327.67	327.67	0.01	Table 2 - Y6 - Value. See table block descr for details.
2.11.3.24	T2_Y7	1787	-327.67	327.67	0.01	Table 2 - Y7 - Value. See table block descr for details.
2.11.3.25	T2_Y8	1788	-327.67	327.67	0.01	Table 2 - Y8 - Value. See table block descr for details.
2.11.3.26	T2_Y9	1789	-327.67	327.67	0.01	Table 2 - Y9 - Value. See table block descr for details.
2.11.3.27	T2_Y10	1790	-327.67	327.67	0.01	Table 2 - Y10 - Value. See table block descr for details.
2.11.3.28	T2_Y11	1791	-327.67	327.67	0.01	Table 2 - Y11 - Value. See table block descr for details.
2.11.3.29	T2_Y12	1792	-327.67	327.67	0.01	Table 2 - Y12 - Value. See table block descr for details.
2.11.3.30	T2_Y13	1793	-327.67	327.67	0.01	Table 2 - Y13 - Value. See table block descr for details.
2.11.3.31	T2_Y14	1794	-327.67	327.67	0.01	Table 2 - Y14 - Value. See table block descr for details.
2.11.3.32	T2_Y15	1795	-327.67	327.67	0.01	Table 2 - Y15 - Value. See table block descr for details.
2.11.4	Table3					Menu Name
2.11.4.1	T3_X0	1796	-327.67	327.67	-1.00	Table 3 - X0 - Value. See table block descr for details.
2.11.4.2	T3_X1	1797	-327.67	327.67	-0.90	Table 3 - X1 - Value. See table block descr for details.
2.11.4.3	T3_X2	1798	-327.67	327.67	-0.75	Table 3 - X2 - Value. See table block descr for details.
2.11.4.4	T3_X3	1799	-327.67	327.67	-0.60	Table 3 - X3 - Value. See table block descr for details.
2.11.4.5	T3_X4	1800	-327.67	327.67	-0.45	Table 3 - X4 - Value. See table block descr for details.
2.11.4.6	T3_X5	1801	-327.67	327.67	-0.30	Table 3 - X5 - Value. See table block descr for details.
2.11.4.7	T3_X6	1802	-327.67	327.67	-0.15	Table 3 - X6 - Value. See table block descr for details.
2.11.4.8	T3_X7	1803	-327.67	327.67	0.00	Table 3 - X7 - Value. See table block descr for details.
2.11.4.9	T3_X8	1804	-327.67	327.67	0.15	Table 3 - X8 - Value. See table block descr for details.
2.11.4.10	T3_X9	1805	-327.67	327.67	0.30	Table 3 - X9 - Value. See table block descr for details.
2.11.4.11	T3_X10	1806	-327.67	327.67	0.45	Table 3 - X10 - Value. See table block descr for details.
2.11.4.12	T3_X11	1807	-327.67	327.67	0.60	Table 3 - X11 - Value. See table block descr for details.
2.11.4.13	T3_X12	1808	-327.67	327.67	0.75	Table 3 - X12 - Value. See table block descr for details.
2.11.4.14	T3_X13	1809	-327.67	327.67	0.90	Table 3 - X13 - Value. See table block descr for details.
2.11.4.15	T3_X14	1810	-327.67	327.67	1.00	Table 3 - X14 - Value. See table block descr for details.
2.11.4.16	T3_X15	1811	-327.67	327.67	1.00	Table 3 - X15 - Value. See table block descr for details.
2.11.4.17	T3_Y0	1812	-327.67	327.67	0.01	Table 3 - Y0 - Value. See table block descr for details.
2.11.4.18	T3_Y1	1813	-327.67	327.67	0.01	Table 3 - Y1 - Value. See table block descr for details.
2.11.4.19	T3_Y2	1814	-327.67	327.67	0.01	Table 3 - Y2 - Value. See table block descr for details.
2.11.4.20	T3_Y3	1815	-327.67	327.67	0.01	Table 3 - Y3 - Value. See table block descr for details.
2.11.4.21	T3_Y4	1816	-327.67	327.67	0.01	Table 3 - Y4 - Value. See table block descr for details.
2.11.4.22	T3_Y5	1817	-327.67	327.67	0.01	Table 3 - Y5 - Value. See table block descr for details.
2.11.4.23	T3_Y6	1818	-327.67	327.67	0.01	Table 3 - Y6 - Value. See table block descr for details.
2.11.4.24	T3_Y7	1819	-327.67	327.67	0.01	Table 3 - Y7 - Value. See table block descr for details.
2.11.4.25	T3_Y8	1820	-327.67	327.67	0.01	Table 3 - Y8 - Value. See table block descr for details.
2.11.4.26	T3_Y9	1821	-327.67	327.67	0.01	Table 3 - Y9 - Value. See table block descr for details.
2.11.4.27	T3_Y10	1822	-327.67	327.67	0.01	Table 3 - Y10 - Value. See table block descr for details.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.11.4.28	T3_Y11	1823	-327.67	327.67	0.01	Table 3 - Y11 - Value. See table block descr for details.
2.11.4.29	T3_Y12	1824	-327.67	327.67	0.01	Table 3 - Y12 - Value. See table block descr for details.
2.11.4.30	T3_Y13	1825	-327.67	327.67	0.01	Table 3 - Y13 - Value. See table block descr for details.
2.11.4.31	T3_Y14	1826	-327.67	327.67	0.01	Table 3 - Y14 - Value. See table block descr for details.
2.11.4.32	T3_Y15	1827	-327.67	327.67	0.01	Table 3 - Y15 - Value. See table block descr for details.
2.12	Identification					Menu Name
2.12.1	Flux Curve a	1355	0.0	250.0	10.0	Flux linearisation point. Init := 100
2.12.2	Flux Curve b	1356	0.0	250.0	20.0	Flux linearisation point. Init := 200
2.12.3	Flux Curve c	1357	0.0	250.0	30.0	Flux linearisation point. Init := 300
2.12.4	Flux Curve d	1358	0.0	250.0	40.0	Flux linearisation point. Init := 400
2.12.5	Flux Curve e	1359	0.0	250.0	50.0	Flux linearisation point. Init := 500
2.12.6	Flux Curve f	1360	0.0	250.0	60.0	Flux linearisation point. Init := 600
2.12.7	Flux Curve g	1361	0.0	250.0	70.0	Flux linearisation point. Init := 700
2.12.8	Flux Curve h	1362	0.0	250.0	80.0	Flux linearisation point. Init := 800
2.12.9	Flux Curve i	1363	0.0	250.0	90.0	Flux linearisation point. Init := 900
2.12.10	Flux Curve j	1364	0.0	250.0	100.0	Flux linearisation point. Init := 1000
2.12.11	Flux Curve k	1365	0.0	250.0	110.0	Flux linearisation point. Init := 1100
2.12.12	Flux Curve l	1366	0.0	250.0	120.0	Flux linearisation point. Init := 1200
2.12.13	Flux Curve m	1367	0.0	250.0	130.0	Flux linearisation point. Init := 1300
2.12.14	Flux Curve n	1368	0.0	250.0	140.0	Flux linearisation point. Init := 1400
2.12.15	Flux Curve o	1369	0.0	250.0	150.0	Flux linearisation point. Init := 1500
2.12.16	Mk Flux Time	660	0	60000	200	[W] Time for magnetize the motor 1 equals 1 ms. Init := 200
2.12.17	Mk Flux Voltage	661	0	30000	201	[W] Magnetizing voltage. 10000 equals nominal voltage of the motor. Init := 201
2.12.18	Meas Rs V Drop	662	0	30000	0	[W] Measured Voltage drop at stator resistance between two phases with nom current of motor. Unit: 256=10%.
2.12.19	Mk Flux V Hw Dt	663	0	30000	140	[W] Magnetizing voltage with hardware dead time compensation. 10000 equals nominal voltage of the motor. Init := 140
2.12.20	Ir Add 0 Pt V	664	0	30000	0	[W] IrAddVoltage for Zero frequency.
2.12.21	Ir Add Gen Scl	665	0	30000	0	[W] Scaleing factor for generator side IR-compensation (0 ... 200%).
2.12.22	Ir Add Mtr Scl	667	0	30000	100	[W] Scaleing factor for motor side IR-compensation (0 ... 200%). Init := 100
2.12.23	Pwr IU Offset	668	-32000	32000	10000	[W] offset value of U-phase current measurement. 1000=unit nom.
2.12.24	Pwr IV Offset	669	-32000	32000	0	[W] offset value of V-phase current measurement. 1000=unit nom.
2.12.25	Pwr IW Offset	670	-32000	32000	0	[W] offset value of W-phase current measurement. 1000=unit nom.
2.12.26	Speed Step	1252	-50.0	50.0	0.0	Speed step used for Identification
2.12.27	Torque Step	1253	-300.0	300.0	0.0	Torque step used for Identification
2.13	Motor					Menu Name
2.13.1	Self Tune Motor	631	0	Ident_Limit	0 / No Action	Identification status. 0 = No Action, 1= No Run, 2 = Run
2.13.2	Motor Nom Currnt	113	MotorC urrentMi n	MotorCurrent Max	3.70	[W] Motor nominal current, I[A] = MotorNomCurrent/CurrentScale//Range[1...65535]//if CurrentScale=10 then 100 equals 10.0 A
2.13.3	Motor Nom Voltg	110	180	690	480	[W] Motor nominal voltage in Volts
2.13.4	Motor Nom Freq	111	8.00	320.00	60.00	[W] Motor nominal frequency in Hz
2.13.5	Motor Nom Speed	112	24	20000	1740	[W] Motor nominal speed in rpm
2.13.6	Motor Ctrl Mode	600	0	4	0 / Freq Control	0 = Open Loop Frequency control//1 = Open Loop Speed control//2 = Open Loop Torque control//3 = Closed Loop Speed control (NXP only)//4 = Closed Loop Torque control (NXP only)//5 = Advanced Open Loop Frequency control (NXP only)//6 = Advanced Open Loop Speed control (NXP only)//
2.13.7	Motor Ctrl Mode2	521	0	4	2 / OL TorqCtrl	0 = Open Loop Frequency control//1 = Open Loop Speed control//2 = Open Loop Torque control//3 = Closed Loop Speed control (NXP only)//4 = Closed Loop Torque control (NXP only)//5 = Advanced Open Loop Frequency control (NXP only)//6 = Advanced Open Loop Speed control (NXP only)
2.13.8	MotorType	0	0	1	0 / Induction	0 = Induction motor, 1 = perm magnet//1 = Permanent magnet synchronous motor
2.13.9	DC-Brake Current	0	MotorC urrentMi n	MotorCurrent Max	3.70	[W] Dc brake current, I[A] = MotorCurrent/CurrentScale//(1...65535)//if CurrentScale=10 then 100 equals 10.0 A. Init := 100
2.13.10	Stop DC-BrakeFr	515	0.10	10.00	1.50	[W] Dc-brake is allowed under this frequency limit,If FreqScale=100 then 5000 equals 50.00 Hz.

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.13.11	FluxBrakeCurrent	519	MotorCurrentMin	UnitVTCCurrent	3.70	[W] Flux brake current[A]=FluxBrakeCurrent/CurrentScale, if CurrentScale=10 then 100 equals 10.0 A Default=MotorNomCurrent.
2.13.12	Voltage at FWP	603	10.00	200.00	100.00	[W] Motor voltage (%*MotorNomVoltage) at field weakening point/(1000...10500) equals (10.0 ...105.00) % * MotorNomVoltage
2.13.13	U/f Mid Freq	604	0.00	FieldWeakeningPoint	50.00	[W] Programmable U/F curve middle point, f[Hz] = UFMidPoint/FreqScale/Range[0...FieldWeakeningPoint]/If FreqScale=100 then 5000 equals 50.00 Hz
2.13.14	U/f Mid Voltg	605	0.00	100.00	100.00	[W] Motor voltage (%*MotorNomVoltage) at programmable U/F curve middle point/(1000...10500) equals (10.0 ...105.00) % * MotorNomVoltage
2.13.15	Zero Freq Voltg	606	0.00	40.00	1.50	[W] Motor voltage (%*MotorNomVoltage) at programmable U/F curve zero point/(1000...10500) equals (10.0 ...105.00) % * MotorNomVoltage
2.13.16	Switching Freq	601	1.0	SwitchingFreqMax	10.0	[W] Switching frequency in 0.1 kHz, Range[1...400]
2.13.17	MagnCurrent	612	0.00	100.00	0.00	Rated magnetizing current for the motor. It is used to adjust the motor voltage in no-load condition.
2.13.18	Slip Adjust	619	0	500	100	The motor name plate speed is used to calculate nominal slip. This value should be used to adjust motor voltage when loaded. Reducing the slip adjust value increases the motor voltage when loaded.
2.13.19	Stop St Magn I	0	0.0	100.0	50.0	Stop state magnetisation (0...1000) = 0 ... 100% of nominal magnetising current
2.13.20	Stop St Magn Tim	0	0	32000	0	Maximum time for stop state magnetisation in s, (0...32000), 0=not in use, negative=infinite
2.13.21	Startup Trq Sel	621	0	3	0 / Not Used	Startup torque is used to reduce erratic motion after start. Torque Memory is used in crane applications. Startup Torque FWD/REV can be used in other applications to help speed controller./0 = Not Used//1 = TorqMemory//2 = Torque Ref//3 = Torq.Fwd/Rev//
2.13.22	StartupTorq FWD	633	-300.0	300.0	0.0	Startup Torque for forward direction if selected with StartUp Torq Sel.
2.13.23	StartupTorq REV	634	-300.0	300.0	0.0	Startup Torque for reverse direction if selected with StartUp Torq Sel.
2.13.24	Start DC-BrakeTm	516	0.00	600.00	0.00	[W] Dc brake time [ms] in ramp start. Init := 0
2.13.25	Motor Cos Phi	120	0.30	1.00	0.85	:= 85
2.13.26	U/f Ratio Select	108	0	3	0 / Linear	[W] U/F ratio selection, 0=linear, 1=squared, 2=programmable
2.13.27	U/f Optimization	109	0	1	0 / None	[W] U/F optimization selection, 0=none, 1=automatic torque boost
2.13.28	Flux Brake	520	0	1	0 / Off	[W] 1=flux brakeing is enabled.
2.13.29	Mtr Ctrl Sw	0	0	2000	1002	Selects between different motor control schemes. Default to Zero Bit.
2.13.30	Cl Ovr Vlt Ref	0	100.00	200.00	118.00	CL OverVoltage Controller reference (10000 = 100.00%)
2.14	Comms					Menu Name
2.14.1	Fieldbus					Menu Name
2.14.1.1	FB Bit Cfg Out00	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord Bit 00
2.14.1.2	FB Bit Cfg Out01	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord Bit 01
2.14.1.3	FB Bit Cfg Out02	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord Bit 02
2.14.1.4	FB Bit Cfg Out03	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord Bit 03
2.14.1.5	FB Bit Cfg Out04	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord and A_SB_Out_Cntl_Word Bit 04
2.14.1.6	FB Bit Cfg Out05	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord and A_SB_Out_Cntl_Word Bit 05
2.14.1.7	FB Bit Cfg Out06	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord and A_SB_Out_Cntl_Word Bit 06
2.14.1.8	FB Bit Cfg Out07	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord and A_SB_Out_Cntl_Word Bit 07
2.14.1.9	FB Bit Cfg Out08	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord and A_SB_Out_Cntl_Word Bit 08
2.14.1.10	FB Bit Cfg Out09	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord and A_SB_Out_Cntl_Word Bit 09
2.14.1.11	FB Bit Cfg Out10	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord and A_SB_Out_Cntl_Word Bit 10
2.14.1.12	FB Bit Cfg Out11	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord and A_SB_Out_Cntl_Word Bit 11
2.14.1.13	FB Bit Cfg Out12	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord and A_SB_Out_Cntl_Word Bit 12
2.14.1.14	FB Bit Cfg Out13	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord and A_SB_Out_Cntl_Word Bit 13

MENU	NAME	ID	MIN	MAX	DEFAULT	DESCRIPTION
2.14.1.15	FB Bit Cfg Out14	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord and A_SB_Out_Cntl_Word Bit 14
2.14.1.16	FB Bit Cfg Out15	0	0	2000	1002	Output field bus bit configuration point to FBGeneralStatusWord and A_SB_Out_Cntl_Word Bit 15
2.14.1.17	FB Word CFG Out1	0	0	2000	1200	Configuration to send to FBProcessDataOUT1
2.14.1.18	FB Word CFG Out2	0	0	2000	1200	Configuration to send to FBProcessDataOUT2
2.14.1.19	FB Word CFG Out3	0	0	2000	1200	Configuration to send to FBProcessDataOUT3
2.14.1.20	FB Word CFG Out4	0	0	2000	1200	Configuration to send to FBProcessDataOUT4
2.14.1.21	FB Word CFG Out5	0	0	2000	1200	Configuration to send to FBProcessDataOUT5
2.14.1.22	FB Word CFG Out6	0	0	2000	1200	Configuration to send to FBProcessDataOUT6
2.14.1.23	FB Word CFG Out7	0	0	2000	1200	Configuration to send to FBProcessDataOUT7
2.14.1.24	FB Word CFG Out8	0	0	2000	1200	Configuration to send to FBProcessDataOUT8
2.14.1.25	FBActSpd_ID	0	0	2000	2	Field bus speed feedback location. Default to MotorSpeed.
2.14.1.26	FB Bit Sel 1	0	0	3	1 / Gen Cntrl W	Selects where the first 4 field bus bits comes from
2.14.1.27	FB Bit Sel 2	0	0	3	1 / Gen Cntrl W	Selects where the second 4 field bus bits comes from
2.14.1.28	FB Bit Sel 3	0	0	3	1 / Gen Cntrl W	Selects where the third 4 field bus bits comes from
2.14.1.29	FB Bit Sel 4	0	0	3	1 / Gen Cntrl W	Selects where the fourth 4 field bus bits comes from
2.14.2	System Bus					Menu Name
2.14.2.1	SBId	0	0	63	0	SystemBus identification number 0 through 63.
2.14.2.2	SBNextId	0	0	63	1	SystemBus next devices id number 0 - 63.
2.14.2.3	SB Mode	0	0	3	0 / Disabled	System bus mode. 0 = Disabled, 1= Master, 2 = Slave, 3 = Both (Not supported yet)
2.14.2.4	SB Out Int1	0	0	2000	1200	System Bus first configurable output to the slaves.
2.14.2.5	SB Out Int2	0	0	2000	1200	System Bus second configurable output to the slaves.
2.14.2.6	SB Comm Fit Resp	0	0	3	3 / Fault,Coast	Response to system bus error.
2.14.2.7	SB Comm Fit Tim	0	0.00	10.00	0.20	System bus communication fault timer. Default at 200 ms.
2.15	Constants					Menu Name
2.15.1	One Bit	1001	0	1		Always set TRUE.
2.15.2	Zero Bit	1002	0	0		Always FALSE.
2.15.3	Zero Analog	1200	0	0		Always zero integer.
2.15.4	One Analog	1201	1	1		Always one integer
2.15.5	Int Ten	1202	10	10		Always 10. Used for scaling
2.15.6	Int Hundred	1203	100	100		Always 100 integer. Used for scaling.
2.15.7	Int Thousand	1204	1000	1000		Always 1000. Used for scaling.
3	Keypad Control					Menu Name
3.1	Keypad Spd Dir	123	0	1	0 / Forward	Keypad control direction.
3.3	Keypad Trq Dir	0	0	1	0 / Forward	Keypad control torque direction.
4	Active Faults					Menu Name
5	Fault History					Menu Name
6	System Menu					Menu Name
7	Expander boards					Menu Name
7.1						Menu Name

APPENDIX C

ALPHABETICAL AND DRAWING COORDINATE
CROSS-REFERENCE

NAME	ID	MENU	COORDINATES
3 Wire St En	0	2.9.6	A5-G25, A5-E25
ABS RJT Ref	1570	1.3.21	A1-R12
Accel Comp	1566	1.3.65	A10-D21
Accel Comp Tc	0	2.3.30	A10-C24
Accel Inp	0	2.8.6	A11-H12
Accel Time 1	103	2.3.1	A11-H12
Accel.Compens.	626	2.4.9	A10-D25
Acceleration Tim	0	1.3.26	A1-F20
Active Flt Last	37	1.3.63	A8-S25
AI1 Type	0	1.5.1	A4-S25
AI2 Type	0	1.5.2	A4-P25
AI3 Type	0	1.5.3	A4-M25
AI4 Type	0	1.5.4	A4-J25
AIN1	1601	1.5.5	A4-S21
AIN1 Fault	0	1.5.9	A4-R21
AIN1 Gain	0	2.10.3.1	A4-R24
AIN1 Off	0	2.10.3.2	A4-R24
AIN1 Tc	0	2.10.3.3	A4-P24
AIN2	1602	1.5.6	A4-P21
AIN2 Fault	0	1.5.10	A4-N21
AIN2 Gain	0	2.10.3.4	A4-N24
AIN2 Off	0	2.10.3.5	A4-N24
AIN2 Tc	0	2.10.3.6	A4-M24
AIN3	1603	1.5.7	A4-L21
AIN3 Fault	0	1.5.11	A4-K21
AIN3 Gain	0	2.10.3.8	A4-L24
AIN3 Off	0	2.10.3.9	A4-K24
AIN3 Slot ID	0	2.10.3.7	A4-L28
AIN3 Tc	0	2.10.3.10	A4-K24
AIN4	1604	1.5.8	A4-J21
AIN4 Fault	0	1.5.12	A4-H21
AIN4 Gain	0	2.10.3.12	A4-H24
AIN4 Off	0	2.10.3.13	A4-H24
AIN4 Slot ID	0	2.10.3.11	A4-J28
AIN4 Tc	0	2.10.3.14	A4-H24
AOUT1 Cal	0	2.10.4.3	A4-R8
AOUT1 ID	0	2.10.4.1	A4-S9
AOUT1 TC	0	2.10.4.4	A4-R8
AOUT1 Val	1590	1.5.13	A4-S5
AOUT1 Zero	0	2.10.4.2	A4-S8
AOUT2 Cal	0	2.10.4.7	A4-N8
AOUT2 ID	0	2.10.4.5	A4-P9
AOUT2 Slot ID	0	2.10.4.9	A4-N5
AOUT2 TC	0	2.10.4.8	A4-M8
AOUT2 Val	1591	1.5.14	A4-P5
AOUT2 Zero	0	2.10.4.6	A4-N8
AOUT3 Cal	0	2.10.4.12	A4-K8
AOUT3 ID	0	2.10.4.10	A4-L9
AOUT3 Slot ID	0	2.10.4.14	A4-L5
AOUT3 TC	0	2.10.4.13	A4-K8
AOUT3 Val	1592	1.5.15	A4-L5
AOUT3 Zero	0	2.10.4.11	A4-L8
AOUT4 Cal	0	2.10.4.17	A4-H8
AOUT4 ID	0	2.10.4.15	A4-J10

NAME	ID	MENU	COORDINATES
AOUT4 Slot ID	0	2.10.4.19	A4-H5
AOUT4 TC	0	2.10.4.18	A4-H8
AOUT4 Val	1593	1.5.16	A4-J5
AOUT4 Zero	0	2.10.4.16	A4-H8
At Zero Spd	1127	1.2.58	A5-S28, A8-C21
At Zero Time	0	2.7.10	A5-S28
Auto Rst ExtF T	725	2.1.40	A8-C6
Auto Rst Mtr OT	726	2.1.39	A8-G6
Auto Rst OC Trls	722	2.1.38	A8-L6, A8-E6
Auto Rst OV Trls	721	2.1.37	A8-K6
Auto Rst StartM	719	2.1.35	A8-C10
Auto Rst SVTime	718	2.1.34	A8-L10
Auto Rst Uload T	738	2.1.41	A8-F6
Auto Rst UV Trls	720	2.1.36	A8-H6
Auto Rst Wait	717	2.1.33	A8-J10
Brake Chopper	0	2.9.9	A11-H18
Brake Chopper	1509	1.3.30	A11-H15
BrakeResistor	1511	1.3.31	A11-G15
C_Enc2_Add	0	2.10.5.9	A4-L16
Cl Ovr Mtr Lim	0	2.5.33	A10-B13
Cl Ovr Vlt En	0	2.9.21	A10-D11
Cl Ovr Vlt Kp	0	2.4.34	A10-B13
Cl Ovr Vlt Ref	0	2.13.30	A10-C14
Cl Ovr Vlt Ti	0	2.4.35	A10-B13
Cntrl Inhib	1099	1.2.1	A1-S26, A3-K24, A5-H2
Cntrl Mode	1506	1.3.13	A1-S18
Coast Stop	0	2.7.9	A5-S25
Com WD	0	2.1.43	A7-C19
Control Place	1505	1.3.12	
Counter1	0	2.10.5.14	A4-P19
Counter1	1528	1.5.19	A4-P13, A11-C11
Counter1 Dec	1294	2.10.5.10	A4-N16
Counter1 Hld	0	2.10.5.12	A4-P19
Counter1 Mult	1295	2.10.5.11	A4-N16
Counter1 Res	0	2.10.5.13	A4-R19
Counter2	1529	1.5.20	A4-J13
Counter2	0	2.10.5.19	A4-J19
Counter2 Dec	1296	2.10.5.15	A4-H16
Counter2 Hld	0	2.10.5.17	A4-K19
Counter2 Mult	1297	2.10.5.16	A4-H16
Counter2 Res	0	2.10.5.18	A4-K19
Curr Cntrl Ti	0	2.4.14	A11-C27
CurrentControlKp	617	2.4.13	A11-D27
DC Brk Cmd	0	2.7.11	A11-T7
DC Tim Cst Stp	0	2.3.34	A11-M8
DC Tim Rmp Stp	0	2.3.33	A11-N8
DC-Brake Current	0	2.13.9	A11-S10
DCVoltage	7	1.3.6	A9-K14, A10-B13
Decel Time	0	2.8.7	A11-H12
Decel Time 1	104	2.3.2	A11-H12
DecelerationTime	0	1.3.27	A1-E20
DIN 1	1011	1.4.1	A4-E25, A5-L28, A5-H28
DIN 2	1012	1.4.2	A4-E25, A5-N28
DIN 3	1013	1.4.3	A4-D25
DIN 4	1014	1.4.4	A4-D25
DIN 5	1015	1.4.5	A4-C25
DIN 6	1016	1.4.6	A4-C25
DIN 7	1017	1.4.7	A4-B24
DIN 8	1018	1.4.8	A4-B24
DIN7 Slot ID	0	2.10.1.1	A4-B27
DIN8 Slot ID	0	2.10.1.2	A4-B27
Disable Ramp	0	2.7.16	A1-K14
DOUT1 ID	0	2.10.2.1	A4-E17
DOUT1 Inv	0	2.10.2.2	A4-F16
DOUT2 ID	0	2.10.2.3	A4-D17
DOUT2 Inv	0	2.10.2.4	A4-E16

NAME	ID	MENU	COORDINATES
DOUT3 ID	0	2.10.2.5	A4-C17
DOUT3 Inv	0	2.10.2.6	A4-C16
DOUT4 ID	0	2.10.2.7	A4-E11
DOUT4 Inv	0	2.10.2.9	A4-F10
DOUT4 Slot ID	0	2.10.2.8	A4-E8
DOUT5 ID	0	2.10.2.10	A4-D11
DOUT5 Inv	0	2.10.2.12	A4-E10
DOUT5 Slot ID	0	2.10.2.11	A4-D8
DOUT6 ID	0	2.10.2.13	A4-C11
DOUT6 Inv	0	2.10.2.15	A4-C10
DOUT6 Slot ID	0	2.10.2.14	A4-B8
Draw Inp	0	2.8.5	A1-R27
Draw Ref	1502	1.3.17	A1-R23
Draw Stpt	1251	2.2.5	A1-R27
DroopFrequency	1549	1.3.15	A9-L24, A10-N24
Earth Fault	703	2.1.16	A8-R16
En Trq RefA	0	2.7.81	A2-J26
En Trq RefB	0	2.7.82	A2-K26
En Trq RefC	0	2.7.83	A2-K25
Enc1 Div	0	2.10.5.4	A4-R15
Enc1 Mlt	0	2.10.5.3	A4-R15
Enc1 Slot ID	0	2.10.5.1	A4-S19
Enc1 Tc	0	2.10.5.5	A4-R15
Enc1_Out	1609	1.5.17	A4-S12
Enc2 Div	0	2.10.5.7	A4-K16
Enc2 Mlt	0	2.10.5.6	A4-K16
Enc2 Slot ID	0	2.10.5.2	A4-M19
Enc2 Tc	0	2.10.5.8	A4-K16
Enc2_Out	1610	1.5.18	A4-L12
Encoder1FiltTime	618	2.10.5.20	A10-M22
Ext Fault Inp	0	2.1.10	A8-J19
Ext Flt Resp	701	2.1.11	A8-J16
Ext Warn	0	1.2.33	A8-N8
Fast Stop	0	2.7.8	A1-F18, A5-S21
Fast Stop Tim	503	2.3.4	A1-D20
Fault Reset	0	2.1.1	A8-S17
Fault Start En	0	2.9.16	A5-R20
FB Bit Cfg Out00	0	2.14.1.1	A7-R17
FB Bit Cfg Out01	0	2.14.1.2	A7-P17
FB Bit Cfg Out02	0	2.14.1.3	A7-P17
FB Bit Cfg Out03	0	2.14.1.4	A7-N17
FB Bit Cfg Out04	0	2.14.1.5	A7-N17
FB Bit Cfg Out05	0	2.14.1.6	A7-M17
FB Bit Cfg Out06	0	2.14.1.7	A7-M17
FB Bit Cfg Out07	0	2.14.1.8	A7-L17
FB Bit Cfg Out08	0	2.14.1.9	A7-L17
FB Bit Cfg Out09	0	2.14.1.10	A7-K17
FB Bit Cfg Out10	0	2.14.1.11	A7-K17
FB Bit Cfg Out11	0	2.14.1.12	A7-J17
FB Bit Cfg Out12	0	2.14.1.13	A7-J17
FB Bit Cfg Out13	0	2.14.1.14	A7-H17
FB Bit Cfg Out14	0	2.14.1.15	A7-H17
FB Bit Cfg Out15	0	2.14.1.16	A7-G17
FB Bit Sel 1	0	2.14.1.26	A7-T24
FB Bit Sel 2	0	2.14.1.27	A7-P24
FB Bit Sel 3	0	2.14.1.28	A7-M24
FB Bit Sel 4	0	2.14.1.29	A7-J24
FB Bit00	1040	1.6.1.1	A7-S21
FB Bit01	1041	1.6.1.2	A7-R21
FB Bit02	1042	1.6.1.3	A7-R21
FB Bit03	1043	1.6.1.4	A7-R21
FB Bit04	1044	1.6.1.5	A7-N21
FB Bit05	1045	1.6.1.6	A7-N21
FB Bit06	1046	1.6.1.7	A7-N21
FB Bit07	1047	1.6.1.8	A7-M21
FB Bit08	1048	1.6.1.9	A7-L21

NAME	ID	MENU	COORDINATES
FB Bit09	1049	1.6.1.10	A7-K21
FB Bit10	1050	1.6.1.11	A7-K21
FB Bit11	1051	1.6.1.12	A7-K21
FB Bit12	1052	1.6.1.13	A7-H21
FB Bit13	1053	1.6.1.14	A7-H21
FB Bit14	1054	1.6.1.15	A7-H21
FB Bit15	1055	1.6.1.16	A7-G21
FB Fix Cntrl Wrđ	1621	1.6.1.17	A7-S27, A7-N27, A7-L27, A7-H27
FB Gen Cntl Wrđ	1630	1.6.1.18	A7-R27, A7-N27, A7-L27, A7-H27
FB Gen Sts Word	1631	1.6.1.19	A7-J14
FB Spd Ref	1632	1.6.2.11	A7-R4
FB Word CFG Out1	0	2.14.1.17	A7-K7
FB Word CFG Out2	0	2.14.1.18	A7-J7
FB Word CFG Out3	0	2.14.1.19	A7-J7
FB Word CFG Out4	0	2.14.1.20	A7-H7
FB Word CFG Out5	0	2.14.1.21	A7-H7
FB Word CFG Out6	0	2.14.1.22	A7-G7
FB Word CFG Out7	0	2.14.1.23	A7-G7
FB Word CFG Out8	0	2.14.1.24	A7-F7
FB Word In 1	1611	1.6.2.1	A7-S8
FB Word In 10	1620	1.6.2.10	A7-R4
FB Word In 2	1612	1.6.2.2	A7-S8
FB Word In 3	1613	1.6.2.3	A7-R8
FB Word In 4	1614	1.6.2.4	A7-R8
FB Word In 5	1615	1.6.2.5	A7-R8
FB Word In 6	1616	1.6.2.6	A7-P8
FB Word In 7	1617	1.6.2.7	A7-S4
FB Word In 8	1618	1.6.2.8	A7-S4, A7-R27, A7-N27, A7-K27, A7-H27
FB Word In 9	1619	1.6.2.9	A7-R4
FB Word Out 1	1622	1.6.3.1	A7-K4
FB Word Out 2	1623	1.6.3.2	A7-J4
FB Word Out 3	1624	1.6.3.3	A7-J4
FB Word Out 4	1625	1.6.3.4	A7-H4
FB Word Out 5	1626	1.6.3.5	A7-H4
FB Word Out 6	1627	1.6.3.6	A7-G4
FB Word Out 7	1628	1.6.3.7	A7-G4
FB Word Out 8	1629	1.6.3.8	A7-F4
FBActSpd_ID	0	2.14.1.25	A7-F7
FBComm.FaultResp	733	2.1.31	A8-H16
Field WeakngPnt	602	2.2.13	A10-H27, A11-M23
Final Freq Ref	1540	1.3.23	A1-J3, A9-M24, A10-P24
Final Iq Trq Ref	1539	1.3.67	A2-J3, A10-B23, A10-R7
Final Trq Ref	1542	1.3.7	A2-H2, A9-G25, A10-G19
Flux Brake	520	2.13.28	A11-L8
Flux Curve a	1355	2.12.1	A11-R17
Flux Curve b	1356	2.12.2	A11-R17
Flux Curve c	1357	2.12.3	A11-P17
Flux Curve d	1358	2.12.4	A11-P17
Flux Curve e	1359	2.12.5	A11-P17
Flux Curve f	1360	2.12.6	A11-N17
Flux Curve g	1361	2.12.7	A11-N17
Flux Curve h	1362	2.12.8	A11-N17
Flux Curve i	1363	2.12.9	A11-M17
Flux Curve j	1364	2.12.10	A11-M17
Flux Curve k	1365	2.12.11	A11-M17
Flux Curve l	1366	2.12.12	A11-L17
Flux Curve m	1367	2.12.13	A11-L17
Flux Curve n	1368	2.12.14	A11-K17
Flux Curve o	1369	2.12.15	A11-K17
FluxBrakeCurrent	519	2.13.11	A11-K9
Fly Strt Flt	0	2.9.5	A5-R28
Freq Delta	1508	1.3.28	A10-D24
Freq Error	0	1.3.25	A10-N18
Freq Max	102	2.5.1	A1-M7, A1-F5, A1-E6, A1-E16, A2-M12, A9-K23, A9-H18, A9-E24
Freq out	1	1.3.24	A7-E6, A9-K21, A10-G27

NAME	ID	MENU	COORDINATES
Freq Ramp Out	1568	1.3.29	A1-P4, A1-J6, A2-M12, A10-D27, A10-S14
Freq Ref LP TC	1309	2.3.11	A1-G19
Freq Reference	1507	1.3.20	A1-J22
FreqReference	25	1.3.22	A1-J19
Gen I Lim En	0	2.9.15	A1-D11
Gen I Lim Ki	0	2.4.26	A1-C11
Gen I Lim Kp	0	2.4.27	A1-D11
Gener Trq Lim	1306	2.5.5	A10-E16
Id Ref	0	1.3.11	A11-S17
Ident Warn	0	1.2.35	A8-N8
In Skip Freq	1085	1.2.21	A1-J22, A11-H12
Input Ph. Superv	730	2.1.13	A8-N16
Int Hundred	1203	2.15.6	A2-P24, A5-B12
Int Ten	1202	2.15.5	A5-B12
Int Thousand	1204	2.15.7	A5-B12
Ir Add 0 Pt V	664	2.12.20	A9-H14
Ir Add Gen Scl	665	2.12.21	A9-H14
Ir Add Mtr Scl	667	2.12.22	A9-J14
Jog enable	1094	1.2.14	A1-N18, A5-D16, A5-P13
Jog F Input	0	2.7.3	A5-N28
Jog F Ref	0	2.8.3	A1-P17
Jog F Speed	1256	2.2.3	A1-P17
Jog FR Input	1087	1.2.15	A5-N16, A5-J28, A5-D28
Jog R Input	0	2.7.4	A5-N28
Jog R Ref	0	2.8.4	A1-P17
Jog R Speed	1257	2.2.4	A1-P17
Keypad Spd Dir	123	3.1	A1-M18
Keypad Trq Dir	0	3.3	A2-K23
Load Drooping	620	2.4.12	A9-L28, A10-N27
LS Scl Div	0	2.6.2	A1-N9, A2-P14
LS to Freq	0	2.6.1	A1-N9, A2-P14
MagnCurrent	612	2.13.17	A11-S28
Master Ref	0	2.8.1	A1-P23
Max RPM	1248	2.5.10	A8-C24
Max Run Stpt	1267	2.5.8	A1-N27
Max Ten Hys	1287	2.5.22	A3-C13
Max Ten Set	1289	2.5.20	A3-D14
Max Tension	1286	2.5.15	A3-C13
MC AtSpeed	1118	1.2.6	A1-K11, A4-C17
MC Fault	1116	1.2.4	A4-E17, A8-R25
MC Ready	1115	1.2.3	A5-S23, A7-S17
MC Reverse	1086	1.2.5	A1-K11
MC Run	1098	1.2.2	A4-D17, A5-H13, A5-K2, A5-J11, A11-R24, A11-R9
MC Warning	1117	1.2.7	A8-R25
MD Drive OK	1058	1.7.10	A7-F25
MD Run Enable	1060	1.7.11	A7-F25
MD Watchdog	1061	1.7.3	A7-F20, A7-E25
MD WD	0	2.1.44	A7-F20
MD WD OK	1172	1.7.2	A7-F17
Meas Rs V Drop	662	2.12.18	A9-E15
Min Frequency	101	2.5.2	A1-M7
Min Run Stpt	1268	2.5.9	A1-M27
Min Ten Set	1288	2.5.21	A3-C14
Mk Flux Time	660	2.12.16	A11-R14
Mk Flux V Hw Dt	663	2.12.19	A11-P14
Mk Flux Voltage	661	2.12.17	A11-P14
Mot Therm 0 Spd	706	2.1.19	A8-L26
MotAmbTempFactor	705	2.1.18	A8-L26
Motor Cos Phi	120	2.13.25	A11-C25
Motor Ctrl Mode	600	2.13.6	
Motor Ctrl Mode2	521	2.13.7	A9-N18, A10-P14
Motor Current	3	1.3.2	A4-S9, A8-N22, A8-K26, A11-D15
Motor Duty Cycle	708	2.1.21	A8-K26
Motor Nom Currnt	113	2.13.2	A1-B17, A11-R27, A11-D19
Motor Nom Freq	111	2.13.4	A9-K28, A10-N27, A11-E19
Motor Nom Speed	112	2.13.5	A11-D19

NAME	ID	MENU	COORDINATES
Motor Nom Voltg	110	2.13.3	A11-E19
Motor Power	5	1.3.4	A11-D15
Motor Speed	2	1.3.1	A4-S16, A4-P9, A7-F7, A8-M23, A8-J26, A8-G28, A8-D27
Motor Torque	4	1.3.3	A8-J25, A9-L28, A9-J21, A9-K14, A9-F25, A10-H22, A11-E15
Motor Voltage	6	1.3.5	A9-J21, A11-E15
MotorCurLimit	1526	1.3.47	A1-C14
Motoring Trq Lim	1305	2.5.4	A10-F16
MotorType	0	2.13.8	A11-B25, A11-P14
Mtr Ctrl Sw	0	2.13.29	A9-P18, A10-R13
Mtr Cur ID	45	1.3.64	A11-H24
Mtr Cur Lim Scl	0	2.8.22	A1-C17
Mtr Cur Limit	1291	2.5.3	A1-C17
Mtr I Lim En	0	2.9.14	A1-E12
Mtr I Lim Ki	0	2.4.24	A1-D12
Mtr I Lim Kp	0	2.4.25	A1-E12
Mtr OT Warn	0	1.2.34	A8-R8
Mtr Therm TC	707	2.1.20	A8-K26
MtrCalcTemp	9	1.3.9	A8-K23
MtrRegStatus	1525	1.3.46	A1-K6
Neg Freq Limit	1301	2.5.30	A1-E5
Neg Spd Ref	1129	1.2.20	A1-N12
Not DIN 1	1021	1.4.9	A4-E23
Not DIN 2	1022	1.4.10	A4-E23
Not DIN 3	1023	1.4.11	A4-D23
Not DIN 4	1024	1.4.12	A4-D23
Not DIN 5	1025	1.4.13	A4-C23
Not DIN 6	1026	1.4.14	A4-C23
Not DIN 7	1027	1.4.15	A4-B22
Not DIN 8	1028	1.4.16	A4-B22
OC Warn	0	1.2.31	A8-S8
One Analog	1201	2.15.4	A5-C12, A6-S27, A6-P27, A6-M27
One Bit	1001	2.15.1	A1-F18, A1-N23, A2-P20, A2-G19, A3-R20, A3-R8, A3-K24, A5-S25, A5-S21, A5-H19, A5-F20, A5-C8, A6-S6, A6-R6, A6-P6, A6-N6, A6-N6, A6-S6
OV Reg Kd	0	2.4.20	A1-G13
OV Reg Ki	0	2.4.19	A1-H13
OV Reg Kp	0	2.4.18	A1-H13
OV Warn	0	1.2.32	A8-S8
Over Temp Warn	1114	1.2.28	A8-P19
Overspeed Resp	0	2.1.12	A8-D16
Overvolt Contr	607	2.9.10	A1-H13
Ovr Spd Inp	0	2.8.12	A8-C24
Ovr Spd Stp	1258	2.5.11	A8-E24
PC Control	1121	1.2.17	A5-H24, A5-F24, A5-D26, A5-M11, A5-M10
Phase Supv F	702	2.1.15	A8-N16
Pos Freq Limit	1300	2.5.29	A1-F5
ProcessPITrimRef	1521	1.3.35	A2-R9, A9-N23, A10-R23
Pwr IU Offset	668	2.12.23	A11-H23
Pwr IV Offset	669	2.12.24	A11-G23
Pwr IW Offset	670	2.12.25	A11-G23
Ramp Hold	0	2.7.6	A1-R4
Ratio Div	0	2.6.18	A1-M22
Ratio Draw En	0	2.9.1	A1-S20
Reverse	1128	1.2.10	A1-M13
Reverse Inp	0	2.7.5	A1-N18
RJT Enable	1097	1.2.12	A5-S2, A5-N13
RJT Ref	1504	1.3.19	A1-R14
Rmp Act Lim	0	2.9.4	A1-K10
Rotor Flux	0	1.3.8	A2-G6, A10-N4, A11-S14
Run Dec Rate	1269	2.3.6	A1-N27
Run Enable	1096	1.2.11	A5-G28, A5-H16, A5-F18, A5-D21, A5-S13, A7-S17
Run In Max	1100	1.2.18	A1-S24
Run In Min	1101	1.2.19	A1-S23
Run Inc Rate	1270	2.3.7	A1-P27
Run Input	0	2.7.1	A5-L28, A5-H28

NAME	ID	MENU	COORDINATES
Run OK	1091	1.2.8	A5-R28, A5-R20, A5-S16, A5-H21, A5-F22, A5-D23
Run Speed	1254	2.2.1	A1-P23
Run Stpt	1503	1.3.18	A1-R17
Run Stpt Dec Inp	0	2.7.14	A1-P27
Run Stpt Dif	1501	1.3.16	A1-R23
Run Stpt Inc Inp	0	2.7.13	A1-P27
Run Stpt Res	0	2.7.12	A1-S26
Run Stpt Up	0	2.9.2	A1-S26
RunRequest	1090	1.2.16	A2-J19, A5-N2, A5-K13
SB Comm Flt Resp	0	2.14.2.6	A8-D16
SB Comm Flt Tim	0	2.14.2.7	A7-D14
SB Comm Lost	0	1.7.12	A7-E16
SB In Cntl Word	1530	1.7.4	A7-R27, A7-M27, A7-K27, A7-G27, A7-F28
SB In Freq Ref	1531	1.7.5	A7-N5
SB In Int1	1532	1.7.6	A7-N5
SB In Int2	1533	1.7.7	A7-M5
SB In Trq Ref	1535	1.7.8	A7-N5
SB Mode	0	2.14.2.3	A7-E15, A7-C28
SB Out Cntl Word	1534	1.7.9	A7-S13
SB Out Int1	0	2.14.2.4	A7-D6
SB Out Int2	0	2.14.2.5	A7-C6
SB WD Pulse	0	1.7.1	A7-S17
SBId	0	2.14.2.1	A7-D28
SBNextId	0	2.14.2.2	A7-C28
SC Trq Chain Sel	0	2.9.17	A10-K16, A10-C23
Self Tune Motor	631	2.13.1	A11-H27
Skip Freq H1	510	2.2.8	A1-H25
Skip Freq H2	512	2.2.11	A1-H25
Skip Freq L1	509	2.2.9	A1-H25
Skip Freq L2	511	2.2.10	A1-G25
Skip Freq Mlt	518	2.3.12	A11-G12
Skip S Rev	0	2.9.3	A1-K14
Slack Div	0	2.6.3	A2-N24
Slack Mult	0	2.8.10	A2-P24
Slack Out	0	2.8.9	A2-P25
Slack Rate	1310	2.3.17	A2-P20
Slack Up	0	2.8.8	A2-R25
Slip Adjust	619	2.13.18	A11-R14
Slk No Ramp	0	2.7.17	A2-P20
Slv No Ramp	0	2.7.15	A1-N23
Slv Rate Lim	1260	2.3.8	A1-N23
Smooth Ratio	500	2.3.3	A1-E20
Smooth Ratio 2	501	2.3.5	A1-D20
Sout Enable	0	2.7.20	A2-S25
Sp ABS In	0	2.8.40	A6-D27
Sp ABS Out	1558	1.3.56	A6-D24
Sp Add Val	1327	2.6.11	A6-G27, A6-F27
Sp Add1 In1	0	2.8.35	A6-G27
Sp Add1 In2	0	2.8.36	A6-F27
Sp Add1 Out	1555	1.3.53	A6-G24
Sp And1 In1	0	2.7.62	A6-F6
Sp And1 In2	0	2.7.63	A6-F6
Sp And1 NIn3	0	2.7.64	A6-E6
Sp And1 Out	1164	1.2.52	A6-F3
Sp And2 In1	0	2.7.65	A6-E6
Sp And2 In2	0	2.7.66	A6-D6
Sp And2 NIn3	0	2.7.67	A6-D6
Sp And2 Out	1165	1.2.53	A6-D3
Sp And3 In1	0	2.7.68	A6-C6
Sp And3 In2	0	2.7.69	A6-C6
Sp And3 NIn3	0	2.7.70	A6-B6
Sp And3 Out	1166	1.2.54	A6-C3
Sp Bmp Dn1	1150	1.2.36	A6-E17
Sp Bmp Dn2	1151	1.2.37	A6-E17
Sp Bmp Hold	0	2.7.44	A6-F20
Sp Bmp In1	0	2.8.44	A6-D20

NAME	ID	MENU	COORDINATES
Sp Bmp In2	0	2.8.45	A6-D20
Sp Bmp Out	1560	1.3.58	A6-D17
Sp Bmp Rate1	1333	2.3.21	A6-C20
Sp Bmp Rate2	1334	2.3.22	A6-C20
Sp Bmp St1	1335	2.2.22	A6-D20
Sp Bmp St2	1336	2.2.23	A6-D20
Sp Bmp Sw	0	2.7.45	A6-E20
Sp Cmp1 Eq	1152	1.2.40	A6-L10
Sp Cmp1 In	0	2.8.52	A6-L14
Sp Cmp1 Out	1153	1.2.41	A6-K10
Sp Cmp1 Thres	0	2.8.53	A6-K14
Sp Cmp1_Hyst	1345	2.2.32	A6-J13
Sp Cmp1_Stpt	1346	2.2.33	A6-K14, A6-K14
Sp Cmp2 Eq	1154	1.2.42	A6-J11
Sp Cmp2 In	0	2.8.54	A6-H14
Sp Cmp2 Out	1155	1.2.43	A6-H10
Sp Cmp2 Thres	0	2.8.55	A6-H14
Sp Cmp2_Hyst	1347	2.2.34	A6-G13
Sp Cmp2_Stpt	1348	2.2.35	A6-H14, A6-H14
Sp Dly1 In	0	2.7.48	A6-F13
Sp Dly1 Out	1156	1.2.44	A6-F11
Sp Dly1 TOFF	1349	2.3.23	A6-E13
Sp Dly1 TON	1350	2.3.24	A6-E13
Sp Dly2 In	0	2.7.49	A6-D13
Sp Dly2 Out	1157	1.2.45	A6-D11
Sp Dly2 TOFF	1351	2.3.25	A6-C13
Sp Dly2 TON	1352	2.3.26	A6-C13
Sp HL High	1341	2.2.28	A6-P14
Sp HL Hyst	1342	2.2.29	A6-M13
Sp HL Inp	0	2.8.50	A6-N14
Sp HL Low	1343	2.2.30	A6-N14
Sp HL Max	1563	1.2.38	A6-P10
Sp HL Min	1564	1.2.39	A6-N10
Sp HL Setpt	0	2.8.51	A6-M13
Sp HL Stpt	1344	2.2.31	A6-M13
Sp Inv1 In	0	2.7.59	A6-M6
Sp Inv1 Out	1161	1.2.49	A6-M4
Sp Inv2 In	0	2.7.60	A6-M6
Sp Inv2 Out	1162	1.2.50	A6-M4
Sp Inv3 In	0	2.7.61	A6-L6
Sp Inv3 Out	1163	1.2.51	A6-L4
Sp LH Decimal	0	2.6.13	A6-L13
Sp Lim Inp	0	2.8.56	A6-M20
Sp Lim Max	1353	2.5.34	A6-M20
Sp Lim Min	1354	2.5.35	A6-L20
Sp Lim Out	1574	1.3.61	A6-M17
Sp LP Fil In	0	2.8.39	A6-K20
Sp LP Fil Out	1557	1.3.55	A6-K17
Sp LP Fil TC	1329	2.3.20	A6-K20
Sp Ltch1 H1	0	2.7.50	A6-S6
Sp Ltch1 H2	0	2.7.51	A6-S6
Sp Ltch1 L	0	2.7.52	A6-T6
Sp Ltch1 Out	1158	1.2.46	A6-S4
Sp Ltch2 H1	0	2.7.53	A6-R6
Sp Ltch2 H2	0	2.7.54	A6-P6
Sp Ltch2 L	0	2.7.55	A6-R6
Sp Ltch2 Out	1159	1.2.47	A6-R4
Sp Ltch3 H1	0	2.7.56	A6-N6
Sp Ltch3 H2	0	2.7.57	A6-N6
Sp Ltch3 L	0	2.7.58	A6-P6
Sp Ltch3 Out	1160	1.2.48	A6-N4
Sp MD1 Div	0	2.8.31	A6-K27
Sp MD1 Dv	1323	2.6.7	A6-J27
Sp MD1 Mlt	1324	2.6.8	A6-K27
Sp MD1 Mul	0	2.8.32	A6-K27
Sp MD1 Out	1553	1.3.51	A6-K24

NAME	ID	MENU	COORDINATES
Sp MD1 Val	0	2.8.29	A6-L27
Sp MD2 Div	0	2.8.33	A6-H27
Sp MD2 Dv	1325	2.6.9	A6-H27
Sp MD2 Mlt	1326	2.6.10	A6-H27
Sp MD2 Mul	0	2.8.34	A6-H27
Sp MD2 Out	1554	1.3.52	A6-J24
Sp MD2 Val	0	2.8.30	A6-J27
Sp Or1 In1	0	2.7.71	A6-L6
Sp Or1 In2	0	2.7.72	A6-K6
Sp Or1 NIn3	0	2.7.73	A6-K6
Sp Or1 Out	1167	1.2.55	A6-K3
Sp Or2 In1	0	2.7.74	A6-J6
Sp Or2 In2	0	2.7.75	A6-J6
Sp Or2 NIn3	0	2.7.76	A6-H6
Sp Or2 Out	1168	1.2.56	A6-J3
Sp Or3 In1	0	2.7.77	A6-H6
Sp Or3 In2	0	2.7.78	A6-G6
Sp Or3 NIn3	0	2.7.79	A6-G6
Sp Or3 Out	1169	1.2.57	A6-G3
Sp Sel1 En1	0	2.7.46	A6-T20
Sp Sel1 In0	0	2.8.46	A6-S20
Sp Sel1 In1	0	2.8.47	A6-R20
Sp Sel1 Out	1561	1.3.59	A6-R17
Sp Sel1 ST0	1337	2.2.24	A6-S20
Sp Sel1 ST1	1338	2.2.25	A6-R20
Sp Sel2 En1	0	2.7.47	A6-R20
Sp Sel2 In0	0	2.8.48	A6-P20
Sp Sel2 In1	0	2.8.49	A6-N20
Sp Sel2 Out	1562	1.3.60	A6-P17
Sp Sel2 ST0	1339	2.2.26	A6-P20
Sp Sel2 ST1	1340	2.2.27	A6-N20
Sp Sub Val	1328	2.6.12	A6-E27, A6-E27
Sp Sub1 In1	0	2.8.37	A6-F27
Sp Sub1 In2	0	2.8.38	A6-E27
Sp Sub1 Out	1565	1.3.54	A6-E24
Sp Sum1 EnA	0	2.7.41	A6-H20
Sp Sum1 EnB	0	2.7.42	A6-J20
Sp Sum1 EnC	0	2.7.43	A6-J20
Sp Sum1 InA	0	2.8.41	A6-H20
Sp Sum1 InB	0	2.8.42	A6-G20
Sp Sum1 InC	0	2.8.43	A6-F20
Sp Sum1 Out	1559	1.3.57	A6-G17
Sp Sum1 StA	1330	2.2.19	A6-G20
Sp Sum1 StB	1331	2.2.20	A6-G20
Sp Sum1 StC	1332	2.2.21	A6-F20
Sp Tbl0 Gn	1320	2.6.4	A6-R27
Sp Tbl0 Inp	0	2.8.23	A6-S27
Sp Tbl0 Out	1550	1.3.48	A6-S23
Sp Tbl0 Xin	0	2.8.24	A6-S27
Sp Tbl1 Gn	1321	2.6.5	A6-N27
Sp Tbl1 Inp	0	2.8.25	A6-P27
Sp Tbl1 Out	1551	1.3.49	A6-P23
Sp Tbl1 Xin	0	2.8.26	A6-P27
Sp Tbl2 Gn	1322	2.6.6	A6-L27
Sp Tbl2 Inp	0	2.8.27	A6-M27
Sp Tbl2 Out	1552	1.3.50	A6-M23
Sp Tbl2 Xin	0	2.8.28	A6-M27
Sp WPVal ID	0	2.8.61	A6-S10
Sp WPVal Inp	0	2.8.63	A6-S13
Sp WPVal2 ID	0	2.8.62	A6-R10
Sp WPVal2 Inp	0	2.8.64	A6-R13
Spd B Rate2	1285	2.3.18	A3-F15
Spd Bump Sw	0	2.7.35	A3-H15
Spd Cmp Fil TC	0	2.3.27	A8-C27
Spd Cntrl F0	0	2.4.3	A10-H27
Spd Cntrl F1	0	2.4.4	A10-H27

NAME	ID	MENU	COORDINATES
Spd Cntrl Kp F0	0	2.4.5	A10-J27
Spd Cntrl Kp FW	0	2.4.6	A10-K27
Spd Cntrl Kp T0	0	2.4.7	A10-K23
Spd Cntrl T0	0	2.4.8	A10-J22
Spd Cont Ki	638	2.4.31	A9-J18
Spd Cont Kp	637	2.4.30	A9-J18
Spd Decimal	0	2.5.14	A8-B24
Spd Err Bnd Frq	0	2.4.10	A10-M16
Spd Err Fil TC	0	2.3.32	A10-N18
Spd Err LP Freq	0	2.4.11	A10-M18
Spd Fdbk	0	2.8.11	A8-D27
Spd Hyst	0	2.5.13	A8-C24
Spd Slk Out	1274	2.2.7	A2-P25
Spd Slk Up	1273	2.2.6	A2-R25
Speed Cntrl Out	1548	1.3.14	A10-N28, A10-N10
Speed Control Kp	613	2.4.1	A10-K26
Speed Control Ti	614	2.4.2	A10-K19
Speed Step	1252	2.12.26	A2-N13
SPI Flt Resp	734	2.1.32	A8-H16
ST Accel Fast	1232	2.3.36	A11-F11
ST Accel Slow	1233	2.3.37	A11-F11
ST Accel Tim	1236	2.3.35	A11-D11
ST Accel Tim ID	0	2.8.65	A11-D11
ST Arm Inp ID	0	2.7.84	A11-B11
ST Cntr Hold	1065	1.2.61	A11-D5
ST Cntr Res	1064	1.2.62	A11-C5
ST Cnts Stpt	0	2.8.71	A11-C11
ST Counter ID	0	2.8.72	A11-C11
ST Decel Fast	1231	2.3.40	A11-E11
ST Decel Slow	1230	2.3.41	A11-E11
ST DecelTim	1235	2.3.39	A11-D11
ST DeceTim ID	0	2.8.68	A11-D11
ST Delay Count	1234	2.3.38	A11-C11
ST Edge Inp ID	0	2.7.85	A11-B11
ST Fast Acc ID	0	2.8.66	A11-G11
ST Fast Dec ID	0	2.8.70	A11-E11
ST Fire Out	1063	1.2.63	A11-D5
ST Ramt to 0	1062	1.2.64	A1-T19, A11-E5
ST Slow Acc ID	0	2.8.67	A11-F11
ST Slow Dec ID	0	2.8.69	A11-E11
Stall Cur Lim	710	2.1.23	A8-N22
Stall Freq	712	2.1.25	A8-M22
Stall Protection	709	2.1.22	A8-M16
Stall Time	711	2.1.24	A8-L20
Start DC-BrakeTm	516	2.13.24	A11-P9
Start Function	505	2.9.7	A1-L14
Start Input	1089	1.2.9	A5-S20, A5-L16
Startup Trq Sel	621	2.13.21	A10-J19
StartupTorq FWD	633	2.13.22	A10-G23
StartupTorq REV	634	2.13.23	A10-G23
Step Ref	1520	1.3.32	A2-R15
Step Reverse	0	2.7.18	A2-S17
Stop 0 Spd Time	616	2.3.10	A5-K8
Stop DC-BrakeFr	515	2.13.10	A11-N8
Stop Funct	0	2.9.8	A1-L14
Stop Input	0	2.7.7	A5-H19, A5-F20
Stop St Magn I	0	2.13.19	A11-S24
Stop St Magn Tim	0	2.13.20	A11-P23
Strt 0 Spd Time	615	2.3.9	A1-H19
Sup Enable	0	2.7.19	A2-S25
Sup Sout	1518	1.3.33	A2-R20
Sup Sout Rp	1519	1.3.34	A2-R18
Switching Freq	601	2.13.16	A11-D19
T0_X0	1700	2.11.1.1	A12-P24
T0_X1	1701	2.11.1.2	A12-N24
T0_X10	1710	2.11.1.11	A12-K24

NAME	ID	MENU	COORDINATES
T0_X11	1711	2.11.1.12	A12-K24
T0_X12	1712	2.11.1.13	A12-J24
T0_X13	1713	2.11.1.14	A12-J24
T0_X14	1714	2.11.1.15	A12-J24
T0_X15	1715	2.11.1.16	A12-H24
T0_X2	1702	2.11.1.3	A12-N24
T0_X3	1703	2.11.1.4	A12-N24
T0_X4	1704	2.11.1.5	A12-M24
T0_X5	1705	2.11.1.6	A12-M24
T0_X6	1706	2.11.1.7	A12-L24
T0_X7	1707	2.11.1.8	A12-L24
T0_X8	1708	2.11.1.9	A12-L24
T0_X9	1709	2.11.1.10	A12-K24
T0_Y0	1716	2.11.1.17	A12-P22
T0_Y1	1717	2.11.1.18	A12-N22
T0_Y10	1726	2.11.1.27	A12-K22
T0_Y11	1727	2.11.1.28	A12-K22
T0_Y12	1728	2.11.1.29	A12-J22
T0_Y13	1729	2.11.1.30	A12-J22
T0_Y14	1730	2.11.1.31	A12-J22
T0_Y15	1731	2.11.1.32	A12-H22
T0_Y2	1718	2.11.1.19	A12-N22
T0_Y3	1719	2.11.1.20	A12-N22
T0_Y4	1720	2.11.1.21	A12-M22
T0_Y5	1721	2.11.1.22	A12-M22
T0_Y6	1722	2.11.1.23	A12-L22
T0_Y7	1723	2.11.1.24	A12-L22
T0_Y8	1724	2.11.1.25	A12-L22
T0_Y9	1725	2.11.1.26	A12-K22
T1_X0	1732	2.11.2.1	A12-P19
T1_X1	1733	2.11.2.2	A12-N19
T1_X10	1742	2.11.2.11	A12-K19
T1_X11	1743	2.11.2.12	A12-K19
T1_X12	1744	2.11.2.13	A12-J19
T1_X13	1745	2.11.2.14	A12-J19
T1_X14	1746	2.11.2.15	A12-J19
T1_X15	1747	2.11.2.16	A12-H19
T1_X2	1734	2.11.2.3	A12-N19
T1_X3	1735	2.11.2.4	A12-N19
T1_X4	1736	2.11.2.5	A12-M19
T1_X5	1737	2.11.2.6	A12-M19
T1_X6	1738	2.11.2.7	A12-L19
T1_X7	1739	2.11.2.8	A12-L19
T1_X8	1740	2.11.2.9	A12-L19
T1_X9	1741	2.11.2.10	A12-K19
T1_Y0	1748	2.11.2.17	A12-P16
T1_Y1	1749	2.11.2.18	A12-N16
T1_Y10	1758	2.11.2.27	A12-K16
T1_Y11	1759	2.11.2.28	A12-K16
T1_Y12	1760	2.11.2.29	A12-J16
T1_Y13	1761	2.11.2.30	A12-J16
T1_Y14	1762	2.11.2.31	A12-J16
T1_Y15	1763	2.11.2.32	A12-H16
T1_Y2	1750	2.11.2.19	A12-N16
T1_Y3	1751	2.11.2.20	A12-N16
T1_Y4	1752	2.11.2.21	A12-M16
T1_Y5	1753	2.11.2.22	A12-M16
T1_Y6	1754	2.11.2.23	A12-L16
T1_Y7	1755	2.11.2.24	A12-L16
T1_Y8	1756	2.11.2.25	A12-L16
T1_Y9	1757	2.11.2.26	A12-K16
T2_X0	1764	2.11.3.1	A12-P13
T2_X1	1765	2.11.3.2	A12-N13
T2_X10	1774	2.11.3.11	A12-K13
T2_X11	1775	2.11.3.12	A12-K13
T2_X12	1776	2.11.3.13	A12-J13

NAME	ID	MENU	COORDINATES
T2_X13	1777	2.11.3.14	A12-J13
T2_X14	1778	2.11.3.15	A12-J13
T2_X15	1779	2.11.3.16	A12-H13
T2_X2	1766	2.11.3.3	A12-N13
T2_X3	1767	2.11.3.4	A12-N13
T2_X4	1768	2.11.3.5	A12-M13
T2_X5	1769	2.11.3.6	A12-M13
T2_X6	1770	2.11.3.7	A12-L13
T2_X7	1771	2.11.3.8	A12-L13
T2_X8	1772	2.11.3.9	A12-L13
T2_X9	1773	2.11.3.10	A12-K13
T2_Y0	1780	2.11.3.17	A12-P11
T2_Y1	1781	2.11.3.18	A12-N11
T2_Y10	1790	2.11.3.27	A12-K11
T2_Y11	1791	2.11.3.28	A12-K11
T2_Y12	1792	2.11.3.29	A12-J11
T2_Y13	1793	2.11.3.30	A12-J11
T2_Y14	1794	2.11.3.31	A12-J11
T2_Y15	1795	2.11.3.32	A12-H11
T2_Y2	1782	2.11.3.19	A12-N11
T2_Y3	1783	2.11.3.20	A12-N11
T2_Y4	1784	2.11.3.21	A12-M11
T2_Y5	1785	2.11.3.22	A12-M11
T2_Y6	1786	2.11.3.23	A12-L11
T2_Y7	1787	2.11.3.24	A12-L11
T2_Y8	1788	2.11.3.25	A12-L11
T2_Y9	1789	2.11.3.26	A12-K11
T3_X0	1796	2.11.4.1	A12-P8
T3_X1	1797	2.11.4.2	A12-N8
T3_X10	1806	2.11.4.11	A12-K8
T3_X11	1807	2.11.4.12	A12-K8
T3_X12	1808	2.11.4.13	A12-J8
T3_X13	1809	2.11.4.14	A12-J8
T3_X14	1810	2.11.4.15	A12-J8
T3_X15	1811	2.11.4.16	A12-H8
T3_X2	1798	2.11.4.3	A12-N8
T3_X3	1799	2.11.4.4	A12-N8
T3_X4	1800	2.11.4.5	A12-M8
T3_X5	1801	2.11.4.6	A12-M8
T3_X6	1802	2.11.4.7	A12-L8
T3_X7	1803	2.11.4.8	A12-L8
T3_X8	1804	2.11.4.9	A12-L8
T3_X9	1805	2.11.4.10	A12-K8
T3_Y0	1812	2.11.4.17	A12-P5
T3_Y1	1813	2.11.4.18	A12-N5
T3_Y10	1822	2.11.4.27	A12-K5
T3_Y11	1823	2.11.4.28	A12-K5
T3_Y12	1824	2.11.4.29	A12-J5
T3_Y13	1825	2.11.4.30	A12-J5
T3_Y14	1826	2.11.4.31	A12-J5
T3_Y15	1827	2.11.4.32	A12-H5
T3_Y2	1814	2.11.4.19	A12-N5
T3_Y3	1815	2.11.4.20	A12-N5
T3_Y4	1816	2.11.4.21	A12-M5
T3_Y5	1817	2.11.4.22	A12-M5
T3_Y6	1818	2.11.4.23	A12-L5
T3_Y7	1819	2.11.4.24	A12-L5
T3_Y8	1820	2.11.4.25	A12-L5
T3_Y9	1821	2.11.4.26	A12-K5
TC Neg Freq Lim	1573	1.3.69	A2-C18, A10-S14
TC Pos Freq Lim	1572	1.3.68	A2-D18, A10-T14
TC Spd Lim Sel	0	2.9.20	A2-E21
Ten At Max	1105	1.2.27	A3-J24, A3-H19, A3-D11
Ten At Min	1106	1.2.26	A3-J24, A3-H19, A3-C11
Ten B Rate	1272	2.3.16	A3-P8
Ten B Sw	0	2.7.27	A3-R8

NAME	ID	MENU	COORDINATES
Ten Bal Dif	0	1.3.37	A3-P17
Ten Bal out	1513	1.3.38	A3-P17
Ten Bal Ret	0	2.9.12	A3-S19
Ten Bal Set	0	2.7.22	A3-R20
Ten Cmp Stp	0	2.8.21	A3-C13
Ten Dec Rate	1263	2.3.13	A3-N16
Ten HL Decimal	0	2.5.23	A3-B13
Ten I Gain	1279	2.4.16	A3-F23
Ten I Inp	0	2.8.17	A3-F23
Ten I Res 1	0	2.7.28	A3-K24
Ten I Res 2	0	2.7.29	A3-K24
Ten I Res 3	0	2.7.30	A3-J24
Ten I Res 4	0	2.7.31	A3-J24
Ten Inc Rate	1264	2.3.14	A3-N17
Ten Inp Stall	1512	1.3.36	A3-P20
Ten Max Lmt	1280	2.5.18	A3-E22
Ten Min Lmt	1281	2.5.19	A3-E22
Ten P Gain	1278	2.4.15	A3-F23
Ten P Inp	0	2.8.18	A3-G23
Ten PI Gn Scale	1282	2.4.17	A3-F23
Ten PI Hold	0	2.7.32	A3-H23
Ten PI Max	1109	1.2.24	A3-J20
Ten PI Min	1108	1.2.25	A3-J20
Ten PI Out	1522	1.3.43	A3-G19
Ten Preload	0	2.8.16	A3-E23
Ten Ramp Rate	1271	2.3.15	A3-P12
Ten Ramped	1516	1.3.41	A3-P9
Ten Ref	1262	2.2.16	A3-R23
Ten Rev Pol	0	2.7.36	A3-H13
Ten Rmp Res	0	2.7.26	A3-R11
Ten Sclk Out	0	2.8.20	A3-F19
Ten Sclk Up	0	2.8.19	A3-G19
Ten Slk Out	1284	2.2.18	A3-F19
Ten Slk Up	1283	2.2.17	A3-G19
Ten Sout En	0	2.7.33	A3-H19
Ten Spd Err	1524	1.3.45	A3-G10
Ten Stall	1261	2.2.15	A3-P23
Ten Stall En	0	2.7.21	A3-R23
Ten Stall Inp	0	2.8.14	A3-P23
Ten Stpt	1514	1.3.39	A3-P13
Ten Stpt Dec	0	2.7.23	A3-N16
Ten Stpt Dif	1515	1.3.40	A3-P13
Ten Stpt Inc	0	2.7.24	A3-P17
Ten Stpt Max	1265	2.5.16	A3-M16
Ten Stpt Max	1102	1.2.22	A3-S13
Ten Stpt Min	1266	2.5.17	A3-M16
Ten Stpt Min	1103	1.2.23	A3-S13
Ten Stpt Res	0	2.7.25	A3-S16
Ten Stpt Up	0	2.9.13	A3-R16
Ten SUP	1523	1.3.44	A3-G15
Ten Sup En	0	2.7.34	A3-H19
Tens Fdbk	0	2.8.15	A3-P20, A3-P9, A3-G24, A3-D14
Tension Inp	0	2.8.13	A3-R23
Tension Ref	1517	1.3.42	A3-P5, A3-H24
Therm Prot F	704	2.1.17	A8-L16
Therm Warn Act	1120	1.2.29	A8-P8
Thermistor Inp	0	2.7.40	A8-J19
ThermistorF.Resp	732	2.1.30	A8-K16
Thread Enable	1095	1.2.13	A5-E28, A5-F16, A5-D19, A5-R13
Thread Input	0	2.7.2	A5-K28, A5-F28
Thread Ref	0	2.8.2	A1-R17
Thread Speed	1255	2.2.2	A1-R17
Torq Ref Select	0	2.9.18	A2-J15
Torq Speed Limit	644	2.5.26	A2-B26
Torque Reference	18	1.3.62	A2-H15, A7-D6
Torque Step	1253	2.12.27	A2-J8

NAME	ID	MENU	COORDINATES
Trq Cntrl Ki	640	2.4.33	A9-F25
Trq Cntrl Kp	639	2.4.32	A9-F25
Trq Dir	0	2.7.38	A2-K23
Trq Lim FWD	1307	2.5.6	A10-F16
Trq Lim Ki	611	2.4.29	A1-B9
Trq Lim Kp	610	2.4.28	A1-C9
Trq Lim REV	1308	2.5.7	A10-E16
Trq No Ramp	0	2.7.39	A2-G19
Trq Ref	0	2.8.57	A2-J27
Trq Ref Act	1536	1.3.66	A10-N2, A11-D26
Trq Ref C	0	2.8.60	A2-F27
Trq Ref DeadZone	0	2.5.28	A2-G12
Trq Ref En	0	2.7.37	A2-J19
Trq Ref Fil TC	0	2.3.31	A2-F10
Trq Ref Gn	1299	2.6.15	A2-G14
Trq Ref Hyst	0	2.5.27	A2-F11
Trq Ref Max	1250	2.5.24	A2-F18
Trq Ref Off	1298	2.6.14	A2-G14
Trq Ref StA	1302	2.2.12	A2-J27
Trq Ref StB	1303	2.2.14	A2-H28, A2-F27
Trq RefB	0	2.8.58	A2-H28
Trq RefB Div	0	2.6.17	A2-G28
Trq RefB Mlt	0	2.8.59	A2-G28
Trq RefB MSt	1304	2.6.16	A2-G28
Trq Rmp Rate	1290	2.3.19	A2-G19
Trq Spd Lim Mode	0	2.9.19	A2-E26
Trq_Ref_Min	1249	2.5.25	A2-F18
U/f Mid Freq	604	2.13.13	A9-J5
U/f Mid Voltg	605	2.13.14	A9-L5
U/f Optimization	109	2.13.27	A9-F13
U/f Ratio Select	108	2.13.26	A9-N10
ULoad Protect F	713	2.1.26	A8-K16
Under Ld State T	716	2.1.29	A8-G24
Under Ld Trq 0	715	2.1.28	A8-H28
Under Ld Trq Nom	714	2.1.27	A8-H28
Unit Temperature	8	1.3.10	A8-P22
User Flt 1	0	2.1.2	A8-F18
User Flt 2	0	2.1.3	A8-F18
User Flt 3	0	2.1.4	A8-E18
User Flt 4	0	2.1.5	A8-D18
User Flt1 Resp	0	2.1.6	A8-G16
User Flt2 Resp	0	2.1.7	A8-F16
User Flt3 Resp	0	2.1.8	A8-E16
User Flt4 Resp	0	2.1.9	A8-E16
UV Cntrl	608	2.9.11	A1-G12
UV Reg Kd	0	2.4.23	A1-F12
UV Reg Kp	0	2.4.21	A1-F12
UV Warn	0	1.2.30	A8-R8
UVolt Fault Resp	727	2.1.14	A8-P16
Voltage at FWP	603	2.13.12	A9-R5, A9-N5, A9-L5, A9-H5, A11-N24
Watchdog In	0	2.7.80	A7-B21
Watchdog Out	1003	1.2.59	A7-D18
WD Com Dly	0	2.3.28	A7-B21
WD Flt Response	0	2.1.42	A8-G16
WD Init Dly Tim	0	2.3.29	A7-C19
WD Trip	0	1.2.60	A7-C15
Win Neg Width	0	2.5.32	A2-C27
Win Pos Width	0	2.5.31	A2-D27
Zero Analog	1200	2.15.3	A3-P20, A3-P9, A3-G24, A3-E23, A3-D14, A4-L9, A4-J10, A5-C12, A6-R27, A6-P27, A6-M27, A6-K27, A6-J27, A6-M20, A6-K20, A6-D27, A6-S13, A6-R13, A6-N14, A7-J7, A7-J7, A7-H7, A7-H7, A7-G7, A7-G7, A7-F7, A7-K7, A7-D6, A7-C6
Zero Bit	1002	2.15.2	A1-P27, A1-N27, A1-R4, A1-M18, A1-K14, A2-R25, A2-S25, A2-S17, A2-J26, A2-K26, A2-K25, A2-K23, A3-R23, A3-P17, A3-N16, A3-R11, A3-H23, A3-H15, A3-H13, A3-

NAME	ID	MENU	COORDINATES
			S16, A4-R19, A4-P19, A4-K19, A4-K19, A4-E11, A4-D11, A4-C11, A5-M28, A5-K28, A5-F28, A5-C8, A6-S20, A6-R20, A6-H20, A6-H20, A6-J20, A6-E20, A6-F20, A6-F13, A6-D13, A6-S6, A6-R6, A6-P6, A6-M6, A6-M6, A6-L6, A6-L6, A6-K6, A6-K6, A6-J6, A6-J6, A6-H6, A6-H6, A6-G6, A6-G6, A6-F6, A6-F6, A6-E6, A6-C6, A6-E6, A6-D6, A6-D6, A6-C6, A6-B6, A7-L17, A7-K17, A7-K17, A7-J17, A7-J17, A7-H17, A7-H17, A7-G17, A7-R17, A7-P17, A7-P17, A7-N17, A7-N17, A7-M17, A7-M17, A7-L17, A7-B21, A8-J19, A8-F18, A8-F18, A8-E18, A8-D18, A8-S17, A8-J19, A9-P18, A10-R13, A11-T7, A11-B11, A11-B11
Zero Detect	1259	2.5.12	A8-D24
Zero Freq Voltg	606	2.13.15	A9-P5, A9-N5, A9-K5, A9-G5

APPENDIX D

PARAMETER ID NUMBER CROSS-REFERENCE

ID	NAME	MENU
1	Freq out	1.3.24
2	Motor Speed	1.3.1
3	Motor Current	1.3.2
4	Motor Torque	1.3.3
5	Motor Power	1.3.4
6	Motor Voltage	1.3.5
7	DCVoltage	1.3.6
8	Unit Temperature	1.3.10
9	MtrCalcTemp	1.3.9
18	Torque Reference	1.3.62
25	FreqReference	1.3.22
37	Active Flt Last	1.3.63
45	Mtr Cur ID	1.3.64
101	Min Frequency	2.5.2
102	Freq Max	2.5.1
103	Accel Time 1	2.3.1
104	Decel Time 1	2.3.2
108	U/f Ratio Select	2.13.26
109	U/f Optimization	2.13.27
110	Motor Nom Voltg	2.13.3
111	Motor Nom Freq	2.13.4
112	Motor Nom Speed	2.13.5
113	Motor Nom Currnt	2.13.2
120	Motor Cos Phi	2.13.25
123	Keypad Spd Dir	3.1
500	Smooth Ratio	2.3.3
501	Smooth Ratio 2	2.3.5
503	Fast Stop Tim	2.3.4
505	Start Function	2.9.7
509	Skip Freq L1	2.2.9
510	Skip Freq H1	2.2.8
511	Skip Freq L2	2.2.10
512	Skip Freq H2	2.2.11
515	Stop DC-BrakeFr	2.13.10
516	Start DC-BrakeTm	2.13.24
518	Skip Freq Mlt	2.3.12
519	FluxBrakeCurrent	2.13.11
520	Flux Brake	2.13.28
521	Motor Ctrl Mode2	2.13.7
600	Motor Ctrl Mode	2.13.6
601	Switching Freq	2.13.16
602	Field WeakngPnt	2.2.13
603	Voltage at FWP	2.13.12
604	U/f Mid Freq	2.13.13
605	U/f Mid Voltg	2.13.14
606	Zero Freq Voltg	2.13.15

ID	NAME	MENU
607	Overvolt Contr	2.9.10
608	UV Contrl	2.9.11
610	Trq Lim Kp	2.4.28
611	Trq Lim Ki	2.4.29
612	MagnCurrent	2.13.17
613	Speed Control Kp	2.4.1
614	Speed Control Ti	2.4.2
615	Strt 0 Spd Time	2.3.9
616	Stop 0 Spd Time	2.3.10
617	CurrentControlKp	2.4.13
618	Encoder1FiltTime	2.10.5.20
619	Slip Adjust	2.13.18
620	LoadDrooping	2.4.12
621	Startup Trq Sel	2.13.21
626	Accel.Compens.	2.4.9
631	Self Tune Motor	2.13.1
633	StartupTorq FWD	2.13.22
634	StartupTorq REV	2.13.23
637	Spd Cont Kp	2.4.30
638	Spd Cont Ki	2.4.31
639	Trq Cntrl Kp	2.4.32
640	Trq Cntrl Ki	2.4.33
644	Torq Speed Limit	2.5.26
660	Mk Flux Time	2.12.16
661	Mk Flux Voltage	2.12.17
662	Meas Rs V Drop	2.12.18
663	Mk Flux V Hw Dt	2.12.19
664	Ir Add 0 Pt V	2.12.20
665	Ir Add Gen Scl	2.12.21
667	Ir Add Mtr Scl	2.12.22
668	Pwr IU Offset	2.12.23
669	Pwr IV Offset	2.12.24
670	Pwr IW Offset	2.12.25
701	Ext Flt Resp	2.1.11
702	Phase Supv F	2.1.15
703	Earth Fault	2.1.16
704	Therm Prot F	2.1.17
705	MotAmbTempFactor	2.1.18
706	Mot Therm 0 Spd	2.1.19
707	Mtr Therm TC	2.1.20
708	Motor Duty Cycle	2.1.21
709	Stall Protection	2.1.22
710	Stall Cur Lim	2.1.23
711	Stall Time	2.1.24
712	Stall Freq	2.1.25
713	ULoad Protect F	2.1.26

ID	NAME	MENU
714	Under Ld Trq Nom	2.1.27
715	Under Ld Trq 0	2.1.28
716	Under Ld State T	2.1.29
717	Auto Rst Wait	2.1.33
718	Auto Rst SVTime	2.1.34
719	Auto Rst StartM	2.1.35
720	Auto Rst UV Trls	2.1.36
721	Auto Rst OV Trls	2.1.37
722	Auto Rst OC Trls	2.1.38
725	Auto Rst ExtF T	2.1.40
726	Auto Rst Mtr OT	2.1.39
727	UVolt Fault Resp	2.1.14
730	Input Ph. Superv	2.1.13
732	ThermistorF.Resp	2.1.30
733	FBComm.FaultResp	2.1.31
734	SPI Flt Resp	2.1.32
738	Auto Rst Uload T	2.1.41
1001	One Bit	2.15.1
1002	Zero Bit	2.15.2
1003	Watchdog Out	1.2.59
1011	DIN 1	1.4.1
1012	DIN 2	1.4.2
1013	DIN 3	1.4.3
1014	DIN 4	1.4.4
1015	DIN 5	1.4.5
1016	DIN 6	1.4.6
1017	DIN 7	1.4.7
1018	DIN 8	1.4.8
1021	Not DIN 1	1.4.9
1022	Not DIN 2	1.4.10
1023	Not DIN 3	1.4.11
1024	Not DIN 4	1.4.12
1025	Not DIN 5	1.4.13
1026	Not DIN 6	1.4.14
1027	Not DIN 7	1.4.15
1028	Not DIN 8	1.4.16
1040	FB Bit00	1.6.1.1
1041	FB Bit01	1.6.1.2
1042	FB Bit02	1.6.1.3
1043	FB Bit03	1.6.1.4
1044	FB Bit04	1.6.1.5
1045	FB Bit05	1.6.1.6
1046	FB Bit06	1.6.1.7
1047	FB Bit07	1.6.1.8
1048	FB Bit08	1.6.1.9
1049	FB Bit09	1.6.1.10
1050	FB Bit10	1.6.1.11
1051	FB Bit11	1.6.1.12
1052	FB Bit12	1.6.1.13
1053	FB Bit13	1.6.1.14
1054	FB Bit14	1.6.1.15
1055	FB Bit15	1.6.1.16
1058	MD Drive OK	1.7.10
1060	MD Run Enable	1.7.11
1061	MD Watchdog	1.7.3
1062	ST Ramt to 0	1.2.64
1063	ST Fire Out	1.2.63
1064	ST Cntr Res	1.2.62
1065	ST Cntr Hold	1.2.61

ID	NAME	MENU
1085	In Skip Freq	1.2.21
1086	MC Reverse	1.2.5
1087	Jog FR Input	1.2.15
1089	Start Input	1.2.9
1090	RunRequest	1.2.16
1091	Run OK	1.2.8
1094	Jog enable	1.2.14
1095	Thread Enable	1.2.13
1096	Run Enable	1.2.11
1097	RJT Enable	1.2.12
1098	MC Run	1.2.2
1099	Cntrl Inhib	1.2.1
1100	Run In Max	1.2.18
1101	Run In Min	1.2.19
1102	Ten Stpt Max	1.2.22
1103	Ten Stpt Min	1.2.23
1105	Ten At Max	1.2.27
1106	Ten At Min	1.2.26
1108	Ten PI Min	1.2.25
1109	Ten PI Max	1.2.24
1114	Over Temp Warn	1.2.28
1115	MC Ready	1.2.3
1116	MC Fault	1.2.4
1117	MC Warning	1.2.7
1118	MC AtSpeed	1.2.6
1120	Therm Warn Act	1.2.29
1121	PC Control	1.2.17
1127	At Zero Spd	1.2.58
1128	Reverse	1.2.10
1129	Neg Spd Ref	1.2.20
1150	Sp Bmp Dn1	1.2.36
1151	Sp Bmp Dn2	1.2.37
1152	Sp Cmp1 Eq	1.2.40
1153	Sp Cmp1 Out	1.2.41
1154	Sp Cmp2 Eq	1.2.42
1155	Sp Cmp2 Out	1.2.43
1156	Sp Dly1 Out	1.2.44
1157	Sp Dly2 Out	1.2.45
1158	Sp Ltch1 Out	1.2.46
1159	Sp Ltch2 Out	1.2.47
1160	Sp Ltch3 Out	1.2.48
1161	Sp Inv1 Out	1.2.49
1162	Sp Inv2 Out	1.2.50
1163	Sp Inv3 Out	1.2.51
1164	Sp And1 Out	1.2.52
1165	Sp And2 Out	1.2.53
1166	Sp And3 Out	1.2.54
1167	Sp Or1 Out	1.2.55
1168	Sp Or2 Out	1.2.56
1169	Sp Or3 Out	1.2.57
1172	MD WD OK	1.7.2
1200	Zero Analog	2.15.3
1201	One Analog	2.15.4
1202	Int Ten	2.15.5
1203	Int Hundred	2.15.6
1204	Int Thousand	2.15.7
1230	ST Decel Slow	2.3.41
1231	ST Decel Fast	2.3.40
1232	ST Accel Fast	2.3.36

ID	NAME	MENU
1233	ST Accel Slow	2.3.37
1234	ST Delay Count	2.3.38
1235	ST DecelTim	2.3.39
1236	ST Accel Tim	2.3.35
1248	Max RPM	2.5.10
1249	Trq_Ref_Min	2.5.25
1250	Trq Ref Max	2.5.24
1251	Draw Stpt	2.2.5
1252	Speed Step	2.12.26
1253	Torque Step	2.12.27
1254	Run Speed	2.2.1
1255	Thread Speed	2.2.2
1256	Jog F Speed	2.2.3
1257	Jog R Speed	2.2.4
1258	Ovr Spd Stp	2.5.11
1259	Zero Detect	2.5.12
1260	Slv Rate Lim	2.3.8
1261	Ten Stall	2.2.15
1262	Ten Ref	2.2.16
1263	Ten Dec Rate	2.3.13
1264	Ten Inc Rate	2.3.14
1265	Ten Stpt Max	2.5.16
1266	Ten Stpt Min	2.5.17
1267	Max Run Stpt	2.5.8
1268	Min Run Stpt	2.5.9
1269	Run Dec Rate	2.3.6
1270	Run Inc Rate	2.3.7
1271	Ten Ramp Rate	2.3.15
1272	Ten B Rate	2.3.16
1273	Spd Slk Up	2.2.6
1274	Spd Slk Out	2.2.7
1278	Ten P Gain	2.4.15
1279	Ten I Gain	2.4.16
1280	Ten Max Lmt	2.5.18
1281	Ten Min Lmt	2.5.19
1282	Ten PI Gn Scale	2.4.17
1283	Ten Slk Up	2.2.17
1284	Ten Slk Out	2.2.18
1285	Spd B Rate2	2.3.18
1286	Max Tension	2.5.15
1287	Max Ten Hys	2.5.22
1288	Min Ten Set	2.5.21
1289	Max Ten Set	2.5.20
1290	Trq Rmp Rate	2.3.19
1291	Mtr Cur Limit	2.5.3
1294	Counter1 Dec	2.10.5.10
1295	Counter1 Mult	2.10.5.11
1296	Counter2 Dec	2.10.5.15
1297	Counter2 Mult	2.10.5.16
1298	Trq Ref Off	2.6.14
1299	Trq Ref Gn	2.6.15
1300	Pos Freq Limit	2.5.29
1301	Neg Freq Limit	2.5.30
1302	Trq Ref StA	2.2.12
1303	Trq Ref StB	2.2.14
1304	Trq RefB MSt	2.6.16
1305	Motoring Trq Lim	2.5.4
1306	Gener Trq Lim	2.5.5
1307	Trq Lim FWD	2.5.6

ID	NAME	MENU
1308	Trq Lim REV	2.5.7
1309	Freq Ref LP TC	2.3.11
1310	Slack Rate	2.3.17
1320	Sp Tbl0 Gn	2.6.4
1321	Sp Tbl1 Gn	2.6.5
1322	Sp Tbl2 Gn	2.6.6
1323	Sp MD1 Dv	2.6.7
1324	Sp MD1 Mlt	2.6.8
1325	Sp MD2 Dv	2.6.9
1326	Sp MD2 Mlt	2.6.10
1327	Sp Add Val	2.6.11
1328	Sp Sub Val	2.6.12
1329	Sp LP Fil TC	2.3.20
1330	Sp Sum1 StA	2.2.19
1331	Sp Sum1 StB	2.2.20
1332	Sp Sum1 StC	2.2.21
1333	Sp Bmp Rate1	2.3.21
1334	Sp Bmp Rate2	2.3.22
1335	Sp Bmp St1	2.2.22
1336	Sp Bmp St2	2.2.23
1337	Sp Sel1 ST0	2.2.24
1338	Sp Sel1 ST1	2.2.25
1339	Sp Sel2 ST0	2.2.26
1340	Sp Sel2 ST1	2.2.27
1341	Sp HL High	2.2.28
1342	Sp HL Hyst	2.2.29
1343	Sp HL Low	2.2.30
1344	Sp HL Stpt	2.2.31
1345	Sp Cmp1_Hyst	2.2.32
1346	Sp Cmp1_Stpt	2.2.33
1347	Sp Cmp2_Hyst	2.2.34
1348	Sp Cmp2_Stpt	2.2.35
1349	Sp Dly1 TOFF	2.3.23
1350	Sp Dly1 TON	2.3.24
1351	Sp Dly2 TOFF	2.3.25
1352	Sp Dly2 TON	2.3.26
1353	Sp Lim Max	2.5.34
1354	Sp Lim Min	2.5.35
1355	Flux Curve a	2.12.1
1356	Flux Curve b	2.12.2
1357	Flux Curve c	2.12.3
1358	Flux Curve d	2.12.4
1359	Flux Curve e	2.12.5
1360	Flux Curve f	2.12.6
1361	Flux Curve g	2.12.7
1362	Flux Curve h	2.12.8
1363	Flux Curve i	2.12.9
1364	Flux Curve j	2.12.10
1365	Flux Curve k	2.12.11
1366	Flux Curve l	2.12.12
1367	Flux Curve m	2.12.13
1368	Flux Curve n	2.12.14
1369	Flux Curve o	2.12.15
1501	Run Stpt Dif	1.3.16
1502	Draw Ref	1.3.17
1503	Run Stpt	1.3.18
1504	RJT Ref	1.3.19
1505	Control Place	1.3.12
1506	Cntrl Mode	1.3.13

ID	NAME	MENU
1507	Freq Reference	1.3.20
1508	Freq Delta	1.3.28
1509	Brake Chopper	1.3.30
1511	BrakeResistor	1.3.31
1512	Ten Inp Stall	1.3.36
1513	Ten Bal out	1.3.38
1514	Ten Stpt	1.3.39
1515	Ten Stpt Dif	1.3.40
1516	Ten Ramped	1.3.41
1517	Tension Ref	1.3.42
1518	Sup Sout	1.3.33
1519	Sup Sout Rp	1.3.34
1520	Step Ref	1.3.32
1521	ProcessPITrimRef	1.3.35
1522	Ten PI Out	1.3.43
1523	Ten SUP	1.3.44
1524	Ten Spd Err	1.3.45
1525	MtrRegStatus	1.3.46
1526	MotorCurLimit	1.3.47
1528	Counter1	1.5.19
1529	Counter2	1.5.20
1530	SB In Cntl Word	1.7.4
1531	SB In Freq Ref	1.7.5
1532	SB In Int1	1.7.6
1533	SB In Int2	1.7.7
1534	SB Out Cntl Word	1.7.9
1535	SB In Trq Ref	1.7.8
1536	Trq Ref Act	1.3.66
1539	Final Iq Trq Ref	1.3.67
1540	Final Freq Ref	1.3.23
1542	Final Trq Ref	1.3.7
1548	Speed Cntrl Out	1.3.14
1549	DroopFrequency	1.3.15
1550	Sp Tbl0 Out	1.3.48
1551	Sp Tbl1 Out	1.3.49
1552	Sp Tbl2 Out	1.3.50
1553	Sp MD1 Out	1.3.51
1554	Sp MD2 Out	1.3.52
1555	Sp Add1 Out	1.3.53
1557	Sp LP Fil Out	1.3.55
1558	Sp ABS Out	1.3.56
1559	Sp Sum1 Out	1.3.57
1560	Sp Bmp Out	1.3.58
1561	Sp Sel1 Out	1.3.59
1562	Sp Sel2 Out	1.3.60
1563	Sp HL Max	1.2.38
1564	Sp HL Min	1.2.39
1565	Sp Sub1 Out	1.3.54
1566	Accel Comp	1.3.65
1568	Freq Ramp Out	1.3.29
1570	ABS RJT Ref	1.3.21
1572	TC Pos Freq Lim	1.3.68
1573	TC Neg Freq Lim	1.3.69
1574	Sp Lim Out	1.3.61
1590	AOUT1 Val	1.5.13
1591	AOUT2 Val	1.5.14
1592	AOUT3 Val	1.5.15
1593	AOUT4 Val	1.5.16
1601	AIN1	1.5.5

ID	NAME	MENU
1602	AIN2	1.5.6
1603	AIN3	1.5.7
1604	AIN4	1.5.8
1609	Enc1_Out	1.5.17
1610	Enc2_Out	1.5.18
1611	FB Word In 1	1.6.2.1
1612	FB Word In 2	1.6.2.2
1613	FB Word In 3	1.6.2.3
1614	FB Word In 4	1.6.2.4
1615	FB Word In 5	1.6.2.5
1616	FB Word In 6	1.6.2.6
1617	FB Word In 7	1.6.2.7
1618	FB Word In 8	1.6.2.8
1619	FB Word In 9	1.6.2.9
1620	FB Word In 10	1.6.2.10
1621	FB Fix Cntrl Wrđ	1.6.1.17
1622	FB Word Out 1	1.6.3.1
1623	FB Word Out 2	1.6.3.2
1624	FB Word Out 3	1.6.3.3
1625	FB Word Out 4	1.6.3.4
1626	FB Word Out 5	1.6.3.5
1627	FB Word Out 6	1.6.3.6
1628	FB Word Out 7	1.6.3.7
1629	FB Word Out 8	1.6.3.8
1630	FB Gen Cntl Wrđ	1.6.1.18
1631	FB Gen Sts Word	1.6.1.19
1632	FB Spd Ref	1.6.2.11
1700	T0_X0	2.11.1.1
1701	T0_X1	2.11.1.2
1702	T0_X2	2.11.1.3
1703	T0_X3	2.11.1.4
1704	T0_X4	2.11.1.5
1705	T0_X5	2.11.1.6
1706	T0_X6	2.11.1.7
1707	T0_X7	2.11.1.8
1708	T0_X8	2.11.1.9
1709	T0_X9	2.11.1.10
1710	T0_X10	2.11.1.11
1711	T0_X11	2.11.1.12
1712	T0_X12	2.11.1.13
1713	T0_X13	2.11.1.14
1714	T0_X14	2.11.1.15
1715	T0_X15	2.11.1.16
1716	T0_Y0	2.11.1.17
1717	T0_Y1	2.11.1.18
1718	T0_Y2	2.11.1.19
1719	T0_Y3	2.11.1.20
1720	T0_Y4	2.11.1.21
1721	T0_Y5	2.11.1.22
1722	T0_Y6	2.11.1.23
1723	T0_Y7	2.11.1.24
1724	T0_Y8	2.11.1.25
1725	T0_Y9	2.11.1.26
1726	T0_Y10	2.11.1.27
1727	T0_Y11	2.11.1.28
1728	T0_Y12	2.11.1.29
1729	T0_Y13	2.11.1.30
1730	T0_Y14	2.11.1.31
1731	T0_Y15	2.11.1.32

ID	NAME	MENU
1732	T1_X0	2.11.2.1
1733	T1_X1	2.11.2.2
1734	T1_X2	2.11.2.3
1735	T1_X3	2.11.2.4
1736	T1_X4	2.11.2.5
1737	T1_X5	2.11.2.6
1738	T1_X6	2.11.2.7
1739	T1_X7	2.11.2.8
1740	T1_X8	2.11.2.9
1741	T1_X9	2.11.2.10
1742	T1_X10	2.11.2.11
1743	T1_X11	2.11.2.12
1744	T1_X12	2.11.2.13
1745	T1_X13	2.11.2.14
1746	T1_X14	2.11.2.15
1747	T1_X15	2.11.2.16
1748	T1_Y0	2.11.2.17
1749	T1_Y1	2.11.2.18
1750	T1_Y2	2.11.2.19
1751	T1_Y3	2.11.2.20
1752	T1_Y4	2.11.2.21
1753	T1_Y5	2.11.2.22
1754	T1_Y6	2.11.2.23
1755	T1_Y7	2.11.2.24
1756	T1_Y8	2.11.2.25
1757	T1_Y9	2.11.2.26
1758	T1_Y10	2.11.2.27
1759	T1_Y11	2.11.2.28
1760	T1_Y12	2.11.2.29
1761	T1_Y13	2.11.2.30
1762	T1_Y14	2.11.2.31
1763	T1_Y15	2.11.2.32
1764	T2_X0	2.11.3.1
1765	T2_X1	2.11.3.2
1766	T2_X2	2.11.3.3
1767	T2_X3	2.11.3.4
1768	T2_X4	2.11.3.5
1769	T2_X5	2.11.3.6
1770	T2_X6	2.11.3.7
1771	T2_X7	2.11.3.8
1772	T2_X8	2.11.3.9
1773	T2_X9	2.11.3.10
1774	T2_X10	2.11.3.11
1775	T2_X11	2.11.3.12
1776	T2_X12	2.11.3.13
1777	T2_X13	2.11.3.14
1778	T2_X14	2.11.3.15
1779	T2_X15	2.11.3.16
1780	T2_Y0	2.11.3.17
1781	T2_Y1	2.11.3.18
1782	T2_Y2	2.11.3.19
1783	T2_Y3	2.11.3.20
1784	T2_Y4	2.11.3.21
1785	T2_Y5	2.11.3.22
1786	T2_Y6	2.11.3.23
1787	T2_Y7	2.11.3.24
1788	T2_Y8	2.11.3.25
1789	T2_Y9	2.11.3.26
1790	T2_Y10	2.11.3.27

ID	NAME	MENU
1791	T2_Y11	2.11.3.28
1792	T2_Y12	2.11.3.29
1793	T2_Y13	2.11.3.30
1794	T2_Y14	2.11.3.31
1795	T2_Y15	2.11.3.32
1796	T3_X0	2.11.4.1
1797	T3_X1	2.11.4.2
1798	T3_X2	2.11.4.3
1799	T3_X3	2.11.4.4
1800	T3_X4	2.11.4.5
1801	T3_X5	2.11.4.6
1802	T3_X6	2.11.4.7
1803	T3_X7	2.11.4.8
1804	T3_X8	2.11.4.9
1805	T3_X9	2.11.4.10
1806	T3_X10	2.11.4.11
1807	T3_X11	2.11.4.12
1808	T3_X12	2.11.4.13
1809	T3_X13	2.11.4.14
1810	T3_X14	2.11.4.15
1811	T3_X15	2.11.4.16
1812	T3_Y0	2.11.4.17
1813	T3_Y1	2.11.4.18
1814	T3_Y2	2.11.4.19
1815	T3_Y3	2.11.4.20
1816	T3_Y4	2.11.4.21
1817	T3_Y5	2.11.4.22
1818	T3_Y6	2.11.4.23
1819	T3_Y7	2.11.4.24
1820	T3_Y8	2.11.4.25
1821	T3_Y9	2.11.4.26
1822	T3_Y10	2.11.4.27
1823	T3_Y11	2.11.4.28
1824	T3_Y12	2.11.4.29
1825	T3_Y13	2.11.4.30
1826	T3_Y14	2.11.4.31
1827	T3_Y15	2.11.4.32

